THE CONDOR

A Magazine of Western Ornithology

Edited by
JOSEPH GRINNELL

JEAN M. LINSDALE
ALDEN H. MILLER
Associate Editors

W. LEE CHAMBERS
JOHN McB. ROBERTSON
Business Managers

VOLUME XXXVII

BERKELEY, CALIFORNIA
1935

THE CONDOR

A Magazine of Western Ornithology

Volume XXXVII January-February, 1935 Number 1

COOPER ORNITHOLOGICAL CLUB

THE CONDOR

A Magazine of Western Ornithology

Published Bi-monthly by the Cooper Ornithological Club

Entered as second-class matter May 15, 1925, at the post-office at Berkeley, California, under Act of Congress of February 28, 1925, Section 412, paragraph 4.

Issued from the Office of THE CONDOR, Museum of Vertebrate Zoology, Berkeley, California.

SUBSCRIPTION RATES

Three Dollars per Year in the United States, payable in advance.
Fifty Cents the single copy.
Three Dollars and Twenty-five Cents per Year in all other countries in the International Postal Union.

COOPER ORNITHOLOGICAL CLUB

Dues are payable in advance on January first for the calendar year: Three Dollars per year for members residing in the United States; Three Dollars and Twenty-five Cents in all other countries. Members whose dues are paid receive THE CONDOR without additional charge.

The Life Membership fee is Seventy-five Dollars. No additional dues are required, and the money is invested and the interest only is used for Club publications. Life Members receive The Condor without additional charge.

Send manuscripts for publication to the Editor, J. GRINNELL, Museum of Vertebrate Zoology, Berkeley, California, or to either of the Associate Editors, JEAN M. LINSDALE and ALDEN H. MILLER, same address.

Send dues and subscriptions to JOHN McB. ROBERTSON, Associate Business Manager, Buena Park, California; orders for back numbers of THE CONDOR and the PACIFIC COAST AVIFAUNA series to W. LEE CHAMBERS, Business Manager, 2068 Escarpa Drive, Eagle Rock, California

Issued January 15, 1935

CONTENTS

bers
bers

sted
ddi-

ark,

PAGE
5
11
16
18
21
24

35
36
37
38
38
39
39
40

40
42
43
43
44
45

45
46

Fig. 1. Attitude assumed by the young condor when startled. The bird is looking down at the disturber.

(Published by kind permission of Miss Kathleen Dougan.)

THE CONDOR

A Bi-monthly Magazine of
Western Ornithology
Published by the
Cooper Ornithological Club

VOLUME XXXVII JANUARY-FEBRUARY, 1935 NUMBER 1

MEETING THE CONDOR ON ITS OWN GROUND

WITH THREE ILLUSTRATIONS

By ERNEST I. DYER

Early in the summer of 1934 short articles appeared in daily papers scattered about the state, purporting to tell of the remarkable success of a "scientific expedition" that had penetrated the fastnesses of the south-central Coast Range of California and rediscovered and photographed a race of gigantic birds, hitherto believed extinct.

Depending, presumably, upon the fancy of the various writers responsible for these literary exercises, the birds were, in some articles, said to be South American Condors and in others: Californian. Accounts differed as to numbers and sizes, but the most favored figure seems to have been about 17, both for the number of birds seen and their wing-spread in feet.

In at least one journal of metropolitan standards, one of the birds was illustrated in the act of carrying off a fawn, and in the caption below the picture, the reader was informed that it showed how the bird was "capable of carrying a fawn in its talons"; thus perpetuating a popular fallacy and, at the same time, affording an excuse for a certain type of hunter to shoot them on sight, regardless alike of law and of sportsmanship.

As the present writer was a member of the party that unwittingly provided the slender basis of fact underlying all of this sensationalism, and the reaction to the articles, brought forth from different parts of the country, indicated a sincere concern for the birds and a legitimate desire for more reliable information, it is the primary purpose of this article to outline what actually happened.

The birds referred to were, of course, California Condors (*Gymnogyps californianus*), happily not yet extinct, as we all know, though sadly diminished in numbers, and now making what is believed to be their last stand against the heedless encroachments of man, to whom they have brought nothing but material benefit and pleasure.

The expedition, so called, was not one in a scientific sense at all. It was rather the expression of a generous act of hospitality on the part of old friends extending to their guests (of which the writer was one) the rare privilege which they, themselves, had enjoyed in the past, of seeing condors at close range in their native habitat, unembarrassed by artificial restraints and under conditions known by experience to be acceptable to the birds.

The ability of our hosts in inducing the condors to conform to a man-made time schedule seemed to partake of the miraculous, until we recognized that it was based on previous contacts with the birds, during which our hosts had acquired a working knowledge of their general habits. Thus, a week or two in advance, we were warned that preparations would be made that would require us to be at ranch headquarters on the evening of a certain date. On arrival there we learned that the condors had promptly acquiesced in the plans as anticipated, and that early the next morning we were to start for a run of sixty or seventy miles by motor, then proceed on horseback over a mountain trail for four hours and meet the condors at the rendezvous. And so it came to pass.

Some days in advance of our arrival, our hosts had prepared a blind near their mountain camp on a detached parcel of their holdings. The blind was intended for the use of such members as cared to photograph the birds at close quarters. It was partly below ground and partly above, with a naturalistic superstructure of branches from the chaparral nearby. About a hundred feet from the blind was placed the carcass of a superannuated horse as bait, carefully located with reference to angle of illumination and character of background.

Our cavalcade proceeded slowly from its initial elevation of about 2500 feet towards its destination, somewhat more than 2000 feet higher. When it was a half-mile or so short of the high pasture where the bait had been placed, and several hundred feet lower, our attention was directed to a cloud of birds milling about in the air above it.

Across, and around, and in and out of the circling mass of lesser birds: crows, ravens and turkey vultures, we descried greater forms gliding steadily and majestically in wider and unwavering orbits, and realized that we were, at last, beholding a portion—too large a portion—of the pitiful remnant of that great race that once ranged, even in historic times, from Baja California on the south, northward through the full length of Alta California up into Oregon and Washington, perhaps even farther.

The trail now passed along the bare face of a high ridge that formed one wall of a deep box canyon out of which rose huge, rounded masses of wind- and weather-sculptured sand-stone embedded in chaparral and thickets of maul oak. The trail dipped to the saddle that connected the ridge with the steep, wooded slope that leads to the rolling field over which the birds were flying. Here we were met by a reception committee (or perhaps an advance guard) of not less than three condors that had detached themselves from the whirling assemblage and sailed grandly over our heads, eyeing us keenly. Our hosts had overlooked nothing! The birds were so close that there was no difficulty in seeing the white patches under the wings of some of them and noting that not all of them had, as yet, acquired the characteristic pinkish-orange heads and necks of the adult.

Just before the rim of the upland pasture was reached, we dismounted in a hollow beneath oaks and conifers and peered carefully over its southern margin in the direction of the bait, which lay in the open near the crest of the box canyon end-wall. About 200 yards away and below us we saw the horse, surrounded and surmounted by condors, turkey vultures, ravens and crows, while above still milled and wheeled the concourse of birds first seen, in apparently undiminished number.

With 6x glasses, and with the naked eye, the writer distinguished and counted at the horse, simultaneously, 7 condors. How many were flying above at the same time was not ascertained, although it is believed that our initial reception committee of three or more was still on high.

It will be understood that we were not, especially at this moment, particularly

keen about gathering statistical data, and had it ever formed a part of our contemplated program, it is more than probable that we would have been disarmed by the rare spectacle before us. Moreover, we were supposed to be just on the threshold of our adventure. As a consequence, no effort was made to determine the absolute maximum of the number of condors present. However, 7 may be accepted with confidence as the absolute minimum seen at the time, with a strong probability that there were really not less than 10, counting those in the air.

One of the "horse-wranglers" of the party, an observant school boy whose duties require that he visit the field frequently, and to whom the sight of condors is no novelty, stood beside the writer at the time and announced that there were 11 condors at the horse and 7 in the air. Several days later, when he returned with horses to take the writer (the last of the party to leave) down the trail again, the subject was broached again casually and his count was unchanged, although it had never been questioned.

In passing, it may be noted that there is a fairly well established local belief that there are 25 or 30 condors resident in the general vicinity, though no systematic census seems to have been attempted. There is a pronounced tendency on the part of the "hill-billies" living in or near this sparsely settled region, to exaggerate (perhaps unconsciously) everything relating to condors; and newspaper reporters do not usually over-exert themselves to compress figures in the interest of verisimilitude. Game is abundant in this region, and the small ranchers derive considerable revenue from parties of hunters whom they pack into the mountains. They have no special interest, therefore, in under-estimating the attractions of the country, either in game or condors. Therein lies one of the principal sources of danger to the birds. The presence of hunters, among whom are inevitably many of irresponsible type, is a distinct menace.

There is a roofless adobe house at our hosts' camp site; roofless because every time the roof is rebuilt, hunters use it for firewood, notwithstanding that there is plenty of fuel available in the fire-scorched chaparral close at hand. This cycle has been repeated for several years in succession, so restoration has been abandoned. Men of the stripe that would do this sort of thing are, unfortunately, all too common among hunters, and would not hesitate to shoot a condor from pure wantonness. In this particular territory there is no protection from such men as long as hunters of all kinds are allowed access. Fortunately, most of the areas known as condor country are within the boundaries of National Forests, and it would seem possible to have certain areas set aside within such forests and close them to hunters, keeping them under federal control as sanctuaries.

To return from the digression: After watching the condors for a few minutes, we continued on to the camp by a trail concealed from them, so that they were not alarmed. About 4:30 we walked back by a different route through the open, rolling field, still concealed from the birds, except for about the last 120 yards. When we topped the last rise at that distance from the horse, all the birds flew off, except one condor that remained quietly standing on the ground near it. We had carried our cameras with us (still and motion picture equipped with telephoto lenses) although, as it was partly cloudy and threatening rain, it was not thought that there would be a favorable opportunity to use them to advantage, our chief reliance for pictures being centered upon use of the blind the next day.

As it turned out, it was highly fortunate that we did take the cameras, as we were about to have our last chance as well as our first chance to get close views, though we did not know it.

As a precaution against possible future failure, from the photographic point of

view, the two with cameras advanced slowly and alternately upon the bird upon the ground, the rest of the party remaining accommodatingly standing in the rear. We started taking pictures at about 110 yards distance, alternately. The condor soon flew to the top of a dead, broken-off pine tree, without increasing his distance from us, and was barely caught with the movie camera in the act of alighting.

We continued our cautious advance as before, taking pictures at intervals, until it proved that the bird was not in the least alarmed, judging by its actions. We then moved about freely at any distance from him suiting our convenience, the closest picture being taken at about 25 feet from him. He proved to be an ideal subject, patient and accommodating, watching us curiously as we set up tripods and shifted about to get different angles. He even tolerated the arrival of the rest of the party with perfect composure, looking down upon us from his superior height benignantly, moving only his head, and that but slightly, to follow our movements. As he seemed prepared to sit there forever in calm repose, and we wanted to see him display his wings, one of the members of the party volunteered to go up the tree and persuade him gently to alter his pose for our benefit. His only response to this encroachment upon his post was to concentrate his gaze upon the climber and wriggle the toes of his turkey-feet slowly. However, when a branch broke with a loud *cr-a-a-ck* under the weight of the climber, whose head was now about six feet from the bird, he raised and partly opened his wings, only to resume his former attitude when the climber retreated, after announcing that he suspected him of an intention of resorting to the turkey buzzard trick of disgorging the contents of his stomach upon him. We were not to have an opportunity of witnessing action of this kind!

It was interesting to note that the condor did not appear to be frightened by the sound of the human voice from the tree just below his feet, nor did he seem to be disturbed by the talk of the party surrounding him. The experience was evidently as novel to him as it was to us, and interest was about equally divided between the two parties.

The cameras had recorded his movements during this episode, but the action was all too short, so another of the party offered to throw a rope into the tree below the bird's feet. This action brought forth some fine displays of raised and partly spread wings (which were recorded on the films) before the bird decided to leave us and perch on one of the sand-stone outcroppings in the canyon below.

This individual was a young bird, still with black head and neck, but beginning to show a white ring around the base of the neck and white spots under the wings. (See fig. 1.)

The bird's bearing throughout this series of incidents won our great admiration for its self-respecting dignity. Its facial expression, if the term is applicable to birds, was at once, noble, innocent and gentle. Such at least was the impression made upon this writer: an impression that he is unable to describe in other terms. Figure 2, a "frame" from the motion picture, does not, perhaps, altogether support this view, but at the time it was taken the condor was just beginning to realize that we were in favor of more action on his part and was getting nervous.

Shortly after this series of episodes, which ended about 5 o'clock, some members of the party went down into the canyon a short distance and there again saw seven condors in what appeared to be a roosting place among the trees that were growing in and about the rocks. One wonders whether this number, seven, twice definitely noted on this day, several hours apart, has any particular significance when considered in connection with the same number reported at a later date (Condor, XXXVI, 1934, p. 255) by an independent observer at Sandberg's, on the "ridge road" in Los Angeles County.

Early next morning, before birds of any kind had appeared at the bait, two of us entered the blind and began a four hour watch. At the end of this time, five condors circled close above us, but did not visit the bait. Four of them lit in the

Fig. 2. The young condor shows first signs of uneasiness. (From motion picture film.)

same stub pine in which we had watched the young bird the day before, and the fifth upon its prostrate top just below. Unfortunately, this tree was directly behind us, with fire-killed brush intervening, and the blind was oriented in exactly the reverse direction. We waited patiently for the condors to approach the horse, but they, as well as all other kinds of birds, refused to do so and finally left. We had, however, a splendid, near view of the group of old and young birds distributed about in the bare branches. The adults, though more colorful, were far less attractive than the young birds, giving the impression of bearing upon their shoulders the full weight of the woes of a vanishing race, with their doleful countenances, sunken eyes and sagging cheeks, and (at least to the writer) unpleasant coloration of heads and necks. In flight, though, they were magnificent, sailing with impressive stability across fluctuating air currents without wavering or making obvious adjustments of wing surfaces, where even the turkey buzzard is unsteady.

During the rest of our stay, including the two days on which the writer was alone, no carrion birds of any kind were seen to visit the bait, despite the fact that almost constant watch was kept (mostly from a distance) from dawn until dark. Condors were seen with more or less frequency, flying about, every day, one or two at a time. Curiously enough, all the other flesh-eating birds were almost as scarce.

Examination of the bait before leaving showed that little noticeable progress had been made in its consumption since the first day, and that it was still only the tender, accessible parts that had been attacked at all. Various theories were advanced as to why the birds had apparently deserted the carcass after the first day, but the most tenable one seems to be that they had removed all portions susceptible of their attentions and were waiting for further decomposition to make profitable an attack

upon parts covered by the tough skin. This theory does not explain why they did not even visit the bait after the first day, unless we assume that they had either some conception of the time necessary to bring about the desired tenderness, or else means of checking progress, through the aid of their senses, while still in flight.

Comparison of experiences with those of a similar, but smaller, party at the same spot, about three years earlier (when five condors were seen simultaneously), showed that the birds behaved in exactly the same way on both occasions.

As a perhaps interesting speculation: Motion pictures taken the next day of two young birds in flight show clearly that at least one of them was not the same bird as the one watched on the stump (because of missing flight feathers in the bird flying, while the one on the stump had all feathers intact). (See fig. 3.) Thus we know that there were at least two youngsters in our group of birds. Two added to the five of a year ago again gives us the figure 7, suggesting that that represents the number more or less permanently resident in that particular locality. That, of course, is pure

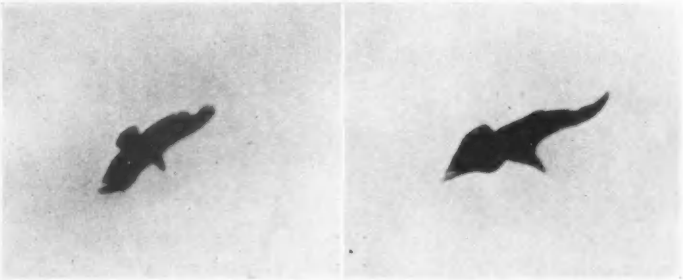

Fig. 3. Silhouettes of two young condors in flight, showing (left) wedge-shaped tail, and (right) extended head.
(From motion picture film.)

speculation, *but* the presence of young birds does most certainly prove that condors are at least reproducing their kind somewhere, now; and this is hopeful.

While, as already stated, our party was not inclined toward precise statistics, we were agreeably surprised at what appeared to be the relatively large proportion of young birds: positively not less than 2 out of 7, and conjecturally 3 out of 10.

In view of the foregoing, and considering that our observations were confined to a strictly limited area as compared with the vast extent of territory known to be physically suited to condors, and considering the short period of observation, the writer feels that the estimate of the total number of these birds now existent in California that is quoted by Dr. Wetmore (Nat. Geog. Mag., LXIV, 1933, p. 64), "possibly ten", is unduly conservative. It seems altogether too improbable that our party, at one essay, should have the incredibly good fortune of securing practically instantaneously on demand, seventy per cent—perhaps even one hundred per cent—of all the condors in California, for its delectation!

On the other hand, sight must not be lost of the fact of the condor's great powers of sustained flight; so that a small number of birds, such as ten, might easily appear, as a whole or in part, with such frequency at widely separated points, as to create a false impression of large numbers and wide distribution of places of residence.

The birds are fairly often seen in open, flat country in the vicinity of ranch houses located near the mountains that they are known to inhabit. They are

repeatedly reported on unimpeachable authority along the Sespe, in Ventura County. We have had recently the Sandberg report above referred to. Two were reported in Santa Clara County, 50 or 60 miles from Oakland as the crow flies, in 1933, and the spot precisely located on a Geological Survey map, with only a slight element of doubt. The surrounding country differs but slightly from that where we watched the birds, though not usually classed as condor territory now.

The apparent ease with which our friends staged the exhibition of condors in their free state, in surprising numbers considering their rarity, tended perhaps to inspire in the minds of the spectators unwarranted optimism regarding the number remaining. Yet, even allowing for this circumstance also, the writer retains the impression that there are more of these birds in the state than is generally supposed to be the case.

As to their future prospects: The trend of their past history undeniably points to ultimate extinction unless conservation measures are promptly put into effect. The circumstance of our having seen young birds, added to the fact that condors are fairly frequently reported, does not necessarily imply that they are increasing, or even holding their own. Even a dying race may reproduce and experience temporary cyclic increases until near the end. Far better informed persons than the writer believe that, for the condor, this end is fast approaching. They need help!

Piedmont, California, November 28, 1934.

GEOLOGIC FACTORS IN THE DISTRIBUTION OF BIRDS

WITH TWO ILLUSTRATIONS

By JUNEA W. KELLY

Every student of biology at some time during the course of his studies asks himself the question "What are the causes that have led to the present distribution of plants and animals?" I feel that through the study of geology some light can be thrown on this subject.

It seems to me that the distribution of birds is both directly and indirectly influenced not only by the topography of the country but by the rock formations and soils resultant from their decay. I have barely begun my observations in this field but by presenting the material I have so far been able to gather from literature and from my own field work I might stimulate others to record their studies along these lines.

I have arranged my material under five headings beginning with the broader aspects of the relationship between geology and ornithology and ending with the more intimate relationship between the soil itself and the birds.

Great changes in land masses.—Although birds by their power of flight are able to cross great expanses of water, yet the great changes in land masses which have taken place from time to time during the past must have had their influences on avian distribution. The subsidences separated continents and formed islands. Opportunity was thus given for development without outside interference. In other cases elevations creating land bridges permitted the easy passage of species into new regions. With repeated subsidences and elevations birds of common ancestry may well have developed into different species, genera and even families. The advance of continental ice sheets must have wiped out whole orders from certain regions and crowded others into the remaining territory, thus giving rise to intense competition

and leading to differentiation of species. With retreat of the ice sheet new territory was opened up to those species best adapted to avail themselves of the opportunity. During certain geologic periods there were repeated advances and retreats of ice caps.

The disturbances just described may easily account for trogons, members of an ancient family, being now found in Africa, Asia, southern United States, Central and South America, but not in Europe where paleontology tells us they once lived. They may account for wood warblers, vireos, tanagers and hummingbirds being restricted to the New World, and rollers, hoopoes and sun birds to the Old World, while Australia has its cassowaries, lyre birds and bower birds and does not have true finches and woodpeckers. Again, pelagic species and shore birds whose territory has been less affected are now more universally distributed than species of land birds.

In this connection the New Madrid earthquake of 1811 is worthy of mention. Here in the northwestern corner of Tennessee through a combination of landslide and uplift the channel of Reelfoot Creek was dammed and Reelfoot Lake formed. Now thousands of American Egrets, hundreds of Great Blue Herons, Little Blue Herons, cormorants, several species of gulls, terns, ducks and other water birds are found on and near the lake—birds that would otherwise never have come to this part of Tennessee. It is interesting to note that Audubon was riding horseback in this vicinity at the time of the earthquake and has described the actual shock which lasted about two minutes. We are accustomed in this age of dam construction to see the effect of artificial bodies of water on bird life, but in the case of Reelfoot we see the creation of a lake by a natural phenomenon such as must have happened frequently in the geologic past.

On the other hand, it is true that on such islands as the Galapagos, six hundred miles off the coast of Ecuador, there are many land birds which may well have come from South America and the West Indies. There are other similar occurrences and many instances of erratic wanderings of birds that can be cited. One example in our Bay Region is the repeated return to Lake Merritt of a lone European Widgeon. The finding, however, of fossils of now living species that no longer inhabit the region where the fossils are found makes it seem certain that great changes in earth configuration have affected the distribution of birds.

Topography.—We think of mountains as barriers and rivers as highways for animals. Again, on account of the power of flight, birds can to a large extent surmount the barriers by flying over them or through gaps or, still further, around the ends of mountain ranges. The mountains do, however, act as barriers as they affect the climate and that in turn the vegetation and insect life available to the birds for food. Rivers not only form habitats but during the spring and fall migrations they are the natural routes followed by many of the birds on their way to and from breeding grounds, as can be observed so well along the Mississippi and Missouri rivers. Large bodies of water such as lakes, seas and oceans affect climate and therefore the fauna of a region. The topography of the shore may or may not furnish suitable habitats for birds and it also has some influence on the migration routes.

Rock decay—soil formation.—Soil is dependent on the kind of rock from which it is derived and also upon the manner of its decay. In a dry climate the weathering is largely mechanical, while in a humid one there is much solution decay. Also in the latter case many of the minerals are leached out of the soil. This difference in weathering is exceptionally well seen in comparing limestone weathering under different climatic conditions. (See Limestone weathering and plant associations of the San Francisco Region, California Journal of Mines and Geology, July and October, 1933; by Junea W. Kelly.) The chemical composition of the soil as well as its texture affects the character of the plant life and this in turn affects

the animal life that depends upon it for food.

Rock decay further influences the distribution of birds in that the resultant topography and soil may produce plains, rolling hills, swamps, marshes, deltas, beaches, and sea cliffs, thus producing habitats themselves. Still another point to be considered is that these beaches may be sandy, consisting largely of quartz grains residual of granite, as can be seen in so many places along the shore of Monterey Peninsula where the Montara granite is weathering. Again, beaches may be muddy as is the case where shales decay and where the finer particles of clay which result from the decay of the feldspars in the granites may have accumulated. The influence of the composition of the soil of our beaches upon the shore birds can be observed locally. Along the shore of Bay Farm Island, Alameda County, California, Snowy Plovers and Sanderlings are found on the sandy stretches whereas they are missing along Fernside Boulevard, Alameda, where many other species less discriminating are often found in large numbers feeding in the mud. Again, rocky shores bring us Oystercatchers, Surf-birds, Wandering Tattlers and Turnstones.

Nesting sites.—It is interesting to note the number of species of birds, as well as the wide range of families represented among the birds, which, although perhaps not dependent upon them, at least use cliffs or shelves, crevices, burrows, and depressions in the ground for nesting purposes. Possibly some that formerly laid their eggs on the bare shelf of a cliff, on account of persecution took shelter in crevices and when these were not available, but the soil permitted, formed the habit of excavating burrows. This may account for the variation of sites used by birds of the same species as seen in the case of puffins, auklets, shearwaters, petrels and others.

The following are some of the birds that use the sites previously mentioned. Cliffs are popular with cormorants, murres, vultures, hawks, swifts; crevices with auklets, puffins, guillemots, rock and canyon wrens, rosy finches; burrows in banks and cliffs with puffins, petrels, kingfishers, bank and rough-winged swallows, owls,

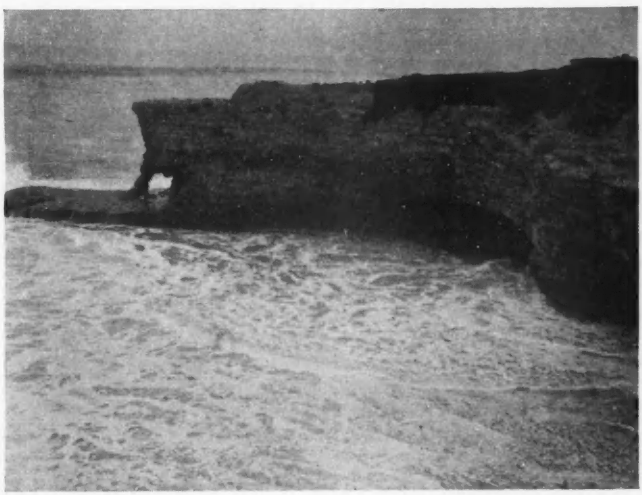

Fig. 4. Sea cliffs near Santa Cruz, showing holes frequented by Pigeon Guillemots.

ground woodpeckers of Africa, nightjars of South America; depressions with shore birds, juncos.

In order to form suitable cliffs and crevices, rocks must weather along planes of stratification, jointing, cleavage or foliation, or must form solution cavities so frequently occurring in limestone.

As an example of how restricted good nesting sites are for guillemots one need but consider the northern coast of Ireland where these birds are numerous on Troy Island and Horn Head while they are practically absent from the neighboring shore. The rocks of the cliffs used are largely gneisses and schists that weather into shelves slightly tilted landward so that the eggs will not roll off, are far enough up on the cliff that storm waves will not wash the eggs away, are surrounded by water at low tide and do not have sharp, jagged pinnacles projecting so that when the young birds leave the nesting shelves, which they do before they are capable of sustained flight, they can get into the water without injury. Deep water is near at hand where they can obtain their food easily.

Coming nearer to our own locality, along the Cliff Drive at Santa Cruz in the steep cliffs of diatomaceous shale the Pigeon Guillemots make use of the holes whence small blocks of rock, loosened by weathering, have fallen. Only a few birds nest here compared to the numbers found in Alaska. Probably our local cliffs are not sufficiently ideal to attract greater numbers of guillemots.

Cliff and Barn swallows have taken kindly to the settlement of the country. The buildings of man have given these birds an opportunity to become much more widely distributed than formerly. The species must have been local and restricted, particularly in the case of Cliff Swallows which not only require a suitable cliff but also an overhanging ledge sufficiently wide to protect their nests from the elements. Coues remarks that Barn Swallows like a corner in artificial situations, which seems a modification of their primitive hole nesting habit.

For those birds that excavate burrows the soil must be soft enough for them to handle and yet firm enough so that the burrow will not collapse. Along the road to Monterey interesting observations were made. One mile south of Sargent along the Southern Pacific tracks is a thick formation of clay, sandstone and gravel. The beds dip about 25° to the south. Here the Bank Swallows have used the sandy clay strata. Cliff Swallows and White-throated Swifts were also nesting here. In a road cut one-half mile southwest of Betabel, Bank Swallows were nesting in the sandy clay beds and not using the coarse gravelly beds nor the strata in which there was cross bedding of the material. Although the Prunedale cutoff was not as yet completed, the new road cuts were beginning to erode, showing the difference in composition of the beds and curiously enough Bank Swallows were perching on the power wires along the road as if considering the possibility of new home sites there.

For birds using depressions in the ground the soil must be such that they can scratch out same. In the case of the Wilson Phalarope the male bird makes the depression. Killdeer favor pebble strewn beaches, and sandy beaches are chosen by the Snowy Plover.

Nesting material.—Here again in looking over the list of birds that use mud in some way as nesting material one is impressed with the wide range of families involved—Flamingoes, Tri-colored and Brewer blackbirds, several species of grackles, magpies, Steller Jays, robins, some of the thrushes, Barn and Cliff swallows, Louisiana Water-thrushes (a wood warbler), Black Phoebes. Robin nests have been found in the construction of which no mud was used because none was available. The reasons were drought or too heavy a cover of forest litter, as in places on islands off the coast of Maine.

Mr. Harwell, naturalist of Yosemite National Park, tells of several attempts of a Black Phoebe to build under a bridge where only granular soil was obtainable

Fig. 5. Pajaro River sand banks, one mile south of Sargent, Santa Clara County, where swallows and swifts nest.

and the nests gave way before they could be used. The phoebes must nest where there are clay residuals. This would apply to all birds that are masons. At the quarry of the Silicate Company of California, twenty-four miles from Stockton on the Borden Highway, there are ideal cliffs with protecting arches where Cliff Swallows nest. The silicious sand is useless for the making of their retort-shaped nests, but fortunately there is a water trough in a cow pasture adjoining, where mud is plentiful.

Conclusion.—From the above facts it seems to me that a study of geology helps one to understand the distribution of birds. Further, that rock decay definitely restricts, at least the nesting range of such birds as Cliff Swallows and Black Phoebes, which must not only find suitable nesting sites but suitable nesting material as well—adhesive clay versus quartz sand. Therefore, unless they change their mode of life they will always be more restricted than such birds as English Sparrows and Starlings which can gain new territory rapidly because they are not restricted as to nesting sites nor material; grass, straw, and feathers can be obtained almost universally.

Alameda, California, November 18, 1934.

FIRE AND BIRD POPULATIONS

By HAROLD W. CLARK

From August 22 to 29, 1931, a severe forest and brush fire swept over Howell Mountain in Napa County, California, spreading eastward to Chiles Valley and northward beyond Middletown, Lake County. Thousands of acres of chaparral, blue oak, yellow pine, and Douglas fir were destroyed. The humidity was low, and everything burned with intense heat, even to the humus of the soil in many places. The heat killed most of the tall trees within the burned area, in many cases drying them out so that they caught up the flames and carried them aloft in fierce crown fires. There was a moderate breeze most of the time, blowing first from one direction and then from another. At no time, however, was the wind strong. The fire ran night and day, in some instances burning fiercely up steep slopes during the night and raging beyond control during the daytime.

The effect of this fire upon the bird life of the region affected has been a matter of considerable interest to me, and the following observations are from notes taken during the fire and at intervals since.

On the east side of the mountain was a heavy growth of tan oak, redwood and Douglas fir, at an elevation of about 1600 feet. During the morning of August 27, while I was patrolling a backfire line, a heavy fire was running through the timber on the hillside a hundred yards below me. Occasionally it would run up into the tops of the trees, making a solid wall of flame a hundred or more feet high. At this time I noticed several small birds flying rapidly through the woods, keeping well ahead of the fire as it drove them up the hill.

On the west side of the mountain, near St. Helena, the fire ran into a mass of chaparral and blue-oak woodland. One fire-fighter reported to me that he saw several Mountain Quail in flight. Sometimes they became confused and circled back into the blaze. Some were seen to burn in the flames. These were not the only creatures doing this, for jack-rabbits were seen running about excitedly and occassionally going back into the fire. On the east side I saw a deer which was apparently crazed by the smoke. He dashed out of the brush above the fire line, crashed into a tree, swerved, looked about wildly, and went smashing off into the burned brush.

One observer reported to me that he saw a small owl, either a Pigmy Owl or a Screech Owl, attack a wood rat that was running before the fire. The smoke was so dense that it was nearly dark and almost impossible to tell from which direction the fire was approaching. Instead of trying to escape, the owl tried again and again to catch the rat, but eventually failed, the rat escaping into the brush.

The burned area remained a barren waste until the heavy rain in the middle of October started grass growing. On October 31, in company with three other bird students, I went over the rough mountainous area to the northwest of Angwin. In many places the hillsides were completely denuded. In others the trees were killed but not burned. In a few sheltered locations a few firs or manzanitas remained unscarred by the fire. On the open grassy slopes grass was appearing, but under the trees, where annual grasses did not grow normally, there was only bare earth. Along the bottom of Bell's Canyon the alders seemed to be almost untouched by the flames, and looked as much alive as ever.

Flickers were fairly common, and seemed to find the effects of the fire to their advantage, as the insects were already apparent in the dead trees. One or two individuals of the Hairy Woodpecker were seen on the branches of a fire-killed oak.

Western Bluebirds flew over in small flocks, but did not stop except in small

areas where live trees still remained. The Thurber Junco was plentiful wherever there were any live trees. Three or four flocks of Bush-tits were also seen foraging about bits of green in trees. One Golden-crowned Sparrow sang from a thicket, but whether there was any green left or not, we could not make out. A Wren-tit was heard singing in what was left of a chaparral thicket.

On April 16, 1932, I went over a portion of Bell's Canyon two miles west of Angwin. A few black oaks and manzanitas survived the fire, and along the creek at the bottom of the canyon the alders and streamside shrubs were unharmed. The burned area was a mass of bloom. Many wild flowers had sprung up in profusion. Apparently the removing of the cover of brush had given them a better chance than usual.

Birds were scarce over the area traversed. A few Bush-tits were seen. Green-backed Goldfinches were the most abundant, supposedly because of the prevalence of seed-bearing plants. A few Western Bluebirds were seen. Audubon and Lutescent warblers were also noted as common along the creek, where the Cassin and Warbling vireos seemed as thick as usual.

On May 8, 1932, I attended a picnic at a ranch three miles north of Angwin, where the hills were formerly covered with black oak, manzanita, and some Douglas fir. Big-leaf maple grew by a spring near-by. Near the ranch buildings the fire had not disturbed the larger trees to any great extent, and the usual assemblage of warblers, vireos, and linnets was heard.

My home is located on a partly open hilltop a few hundred yards back of the campus of Pacific Union College, and is surrounded by thickets of blackberry, grape, manzanita, roses, lilac, and coyote brush (*Baccharis pilularis*). Ordinarily about three families of the Western House Wren occupy the territory in the immediate vicinity of my home. The spring after the fire one or two extra families crowded into the territory. In the woods near-by the Cassin Vireo and Western Warbling Vireo were more noticeable than usual, and about the campus of the college the vireos and the Pacific Black-headed Grosbeak were the subject of comment by even casual observers on account of their unusual abundance.

Thinking that perhaps our observations were merely concomitant with an increased interest in the problem of their sustenance, and that our impressions were due to our expectation of an increased local population, I gave careful attention to the density of the bird population during the springs of 1933 and of 1934. In both cases the birds mentioned were back to practically their original status. Vireos were heard only scatteringly, as usual, and grosbeaks in considerably decreased numbers from what we noticed in 1932. The same number of wren families occupied the territory about my home as in years before the fire.

In correlating these conclusions with the changes in the burned area, field trips in the spring of 1934 showed that over a considerable portion of the country the oaks had sprouted new shoots, which were now from four to six feet high, and densely foliated. Alders and willows along the streams were as healthy as ever, having received little if any permanent damage. Many small shrubs had sprouted new growth. A heavy growth of herbaceous plants covered the ground. Except for areas formerly covered with manzanita or conifers, the vegetation appeared to be sufficient to give abundant forage to most birds.

The upset in the bird population over the mountain was apparently a temporary matter, and easily compensated for by a crowding of territories until conditions righted themselves. A few species would evidently have to find new territories. However, the changes incident to the fire would likely open up new areas for their settlement, to compensate for those lost. Such a readjustment could easily

be made in a season or two; in fact, that such was actually the case is borne out by the observation that as one walks through the burned area now, three years after the fire, he sees and hears about the same grouping of birds that he used to notice. Except for changes in location, the general population is about the same. This might not be true in a broad area where the vegetation type is uniform. In such a case the destruction of the plant life would change the environment so that an entirely new line-up of populations might occur. But in a rugged mountain area such as we have in the north coast ranges of California, the checkered arrangement of ecological areas makes a readjustment comparatively easy. Birds finding their accustomed habitats destroyed will not have far to go until they find other areas where either new growth of vegetation or replacement of old types will afford them their usual conditions of life.

In conclusion, I am led to speculate as to the relation ordinarily maintained between the bird population and the territory. If my observations are valid, they would seem to indicate that a crowding of bird populations may occur, at least temporarily. That raises the question as to whether under normal conditions the bird population in any given territory is at its saturation point, or whether other factors aside from the ability of the territory to support bird life may not at least be a contributing factor to the regulation of the populations. Anyway, the problem is one that will bear investigation.

Angwin, California, October 2, 1934.

THE THICK-BILLED PARROT IN SOUTHERN ARIZONA

By ALEXANDER WETMORE

In a recent number of the Condor (36, 1934, pp. 180-181) Professor Charles T. Vorhies has given interesting information on the latest known occurrence of the Thick-billed Parrot (*Rhynchopsitta pachyrhyncha*) in Arizona, to which I may be permitted to add some additional data. During June and July, 1919, I was engaged in field work in southern Arizona for the Bureau of Biological Survey and as a part of this work secured what information I could on parrots. In work in Pinery Canyon I was a guest in the camp of Mr. and Mrs. J. Eugene Law and subsequently placed my notes at Mr. Law's disposal, as he had planned a full account of the avifauna of the Chiricahua region. Illness prevented completion of this project and the data secured on parrots were not published, except that in reading the proof sheets of the fourth edition (1931) of the A. O. U. Check-list I added certain localities that extended the previously known range for these birds within our limits. The data that follow were obtained from reliable observers and were checked where possible by inquiry from different sources.

In Pinery Canyon, Thick-billed Parrots were observed by Mr. F. Hands on August 20, 1917. On this day he heard a strange noise and, stepping to the door identified it as the calling of parrots, a sound that he had heard in other years. To verify his identification he followed the sound and found six or eight of the birds feeding in a pine over a mile away. From this date the number of parrots in Pinery Canyon increased steadily until by September 1 about 300 were present. As cold weather came during the fall some of the birds disappeared. Others remained during the entire winter, although at one time the ground was covered by six inches of snow for over two weeks and the birds were forced to seek their food on the ground

where this covering had blown partly away. The last was observed in Pinery Canyon on March 26 or 27, 1918, when a flock of ten or twelve was seen. The birds ranged in Pinery and Pine canyons and to a less extent in Bonita Canyon. According to O. C. Duffner of Paradise, none was found at this time in the canyons leading down on the eastern side at the north end of the Chiricahua Range.

In Rucker Canyon to the south Thick-billed Parrots were more abundant. According to Theodore Hampa the first arrived during the first week of July, 1917. A flock of fifty or sixty was noted first and the birds increased steadily until by early fall 1000 or possibly 1500 were present. They ranged above the junction of Rucker and Whitewater rivers, covering the high slopes of Monte Vista. Though the birds were at Hampa's Ranch at the junction of the two rivers mentioned, early in July, Fred Heine who lived a mile below did not observe them at his place until late in August, although the difference in altitude between the two points was slight. The birds remained throughout the winter though they wandered much and occasionally were not observed for a week at a time. By November they had decreased somewhat in number, but a few were present until March, 1918. The birds were said to range into Price Canyon on the eastern side of the range but were not reported from other nearby localities.

In the Dragoon Mountains W. J. Waln informed me that a considerable flock of parrots arrived in Cochise Stronghold Canyon about the end of July or the first of August, 1917, and remained for about six weeks. These birds were observed to fly directly out across the flats to the east and to return at night so that it is possible that they may have crossed to the Chiricahua Mountains to feed. Mr. Waln killed one and nailed it on the wall of a shed where it was examined by several persons who told me of it. This specimen had been burned a few months previous to my visit.

Mr. T. Swift, Forest Supervisor of the Crook National Forest, at Safford, Arizona, told me that in 1918 one of his rangers reported parrots in Rattlesnake Canyon at the northern end of the Galiuro Mountains, west of the Graham Range. About 150 appeared about the middle of May and remained through the summer until early fall. The birds ranged here in an area covered with new growth yellow pine. Stockmen had also reported to Mr. Swift that in former years parrots had appeared occasionally in the southern end of the Graham Mountains.

R. Winkler who resides near the mouth of Rucker Canyon said that parrots had been seen by his son above Deer Creek on Animas Peak in southwestern New Mexico.

According to newspaper report parrots were found by Fred Miller near Mowry in Santa Cruz County, Arizona, in September, 1917. John Deegan, Sheriff of Nogales, was also said to have seen them.

On their arrival in the Chiricahua Mountains Thick-billed Parrots began to feed on the cones of Chihuahua pine (*Pinus chihuahuana*) and continued to eat the seeds of this tree until the entire crop had been consumed. In Rucker Canyon at the time of my visit the ground under many trees was still covered with cones from which the seeds had been extracted. The parrots pulled out or twisted off the heavy scales so that the fibres remaining gave the cone the appearance of having been shredded more or less completely. The cones were attacked as soon as the seed was in the dough. Occasionally I found cones of yellow pine (*Pinus brachyptera*) that showed signs of the same work, but such instances were rare so that apparently the parrots had not cared for the long heavy cones of this tree. It is possible that ease in handling was one basis for preference for the Chihuahua pine. According to Sudworth (U. S. Dept. Agr., Bull. 460, The Pine Trees of the Rocky Mountain Region, p. 37), cones of the Chihuahua pine are matured in September, so that the

birds must have begun eating these seeds while they were still quite soft.

During previous invasions (1904) parrots were said to have eaten pinyon nuts but were not known to have done this in 1917 and 1918. Two species of this group occur here in fair numbers, the Mexican pinyon (*Pinus cembroides*) and the pinyon (*Pinus edulis*).

When the harvest of pine cones was completed the Thick-billed Parrots turned their attention to an abundant crop of acorns and these formed their food through fall and winter. The birds fed at first in the trees and then later descended to the ground in search of fallen nuts. At least four species of oaks are common here and all probably furnished food for these birds. The white-leaf oak (*Quercus hypoleuca*), abundant on the upper slopes (low Transition and high Upper Sonoran), has a very sweet acorn. The Arizona oak (*Quercus arizonica*), *Quercus reticulata* and *Quercus grisea* cover extensive areas.

According to various newspaper accounts the Thick-billed Parrot had come in flocks into fields of feterita and kaffir corn, and had fed in them extensively, and it was also said that they ate corn. Careful inquiry however among the ranchers in the Chiricahua Mountains showed these statements to be groundless and that the food of the birds as stated above was made up entirely of pine seeds and acorns. In Pinery Canyon Mr. F. Hands said that the parrots fed constantly in oaks bordering fields of corn and small grains, coming to the borders of the clearings but never attacking or injuring the crops in any way. The same statement was made by other ranchers here and farther south. F. Heine in Rucker Canyon said that when the birds reached his ranch apples were still on the trees in his orchard. He watched the feeding habits of the parrots with much interest for this reason, but though they came about the place none offered to injure the fruit.

According to all accounts Thick-billed Parrots gathered at night to roost in flocks and then spread out in small bands to feed during the day. In Pinery Canyon they roosted somewhere on the upper mountain slopes during summer and fall. Morning and evening they were seen in two large flocks. As the weather became colder the roosting place was changed to one at a lower altitude. In Rucker Canyon the birds came at night to the mountain side above the site of old Camp Rucker. As there were a thousand or more here, their morning and evening flights were quite impressive. In the Dragoon Range the parrots roosted somewhere near the head of Cochise Stronghold and made a morning flight that often carried them directly out over the plains to the east.

In feeding, the large bands usually broke up into smaller parties. In winter such flocks at times came down to perch on broken sandstone ledges where they clambered about or basked in the sun. In Rucker Canyon toward evening flocks often flew down to the river to drink before passing on to their roost. In the Chiricahua Mountains during late fall and winter the birds came down into the foothills to an altitude of between 5000 and 5500 feet though earlier they were confined to the higher basins.

The birds were noisy and their coming was heralded by their loud calls that were said to be readily audible at a distance of more than a mile. Like parrots elsewhere they were said to show much fear of hawks (though it seems strange that a bird with so powerful a bill and so muscular a body should show such fear); when a red-tail or a hawk of some other species appeared they rose in flocks and circled in the air, doubling the volume of their ordinary screeching calls.

In August when the birds first appeared in Pinery Canyon, Mr. Hands stated that he was certain from their plumage that many of them were young that had been hatched that year. At this season when they were feeding on pine cones the feathers

of breast and head were often smeared with pitch. I have examined several specimens taken at this time in which the feathers were very dirty from this cause.

In Pinery Canyon according to the best information available about seventy-five or possibly one hundred parrots were killed. Probably half of these found their way into collections of bird skins while the remainder were sent to Chandler Brothers, in El Paso, and Colburn, Los Angeles (taxidermists). In Rucker Canyon where the birds were most numerous not more than half a dozen were destroyed: these were killed by hunters through curiosity.

Though parrots apparently remained through the summer in the Galiuro Range, whether they bred there is uncertain. From available accounts the birds in Mexico nest usually in abandoned nesting holes of the Imperial Woodpecker (*Campephilus imperialis*). Suitable nesting cavities for these parrots could be found in large pines in our mountains but are not common. The date of arrival of the Thick-billed Parrot in 1917 seems remarkably early as Thayer (Auk, 23, 1906, pp. 223-224), records nests containing eggs or small young near Colonia Pachacho and Colonia Garcia, Chihuahua, from August 11 to August 28, 1905, and Bergtold (Aug, 23, 1906, pp. 428), secured partly fledged young near Parral on October 5, 1904. From these dates it would seem that there is some variation in the time of nesting, as the parrots arrived in the Chiricahuas at a time when they had been breeding during other years.

United States National Museum, Washington, D. C., October 3, 1934.

GEOGRAPHICAL DISTRIBUTION AND DISPLAY COLORS OF TROCHILIDAE

By A. L. PICKENS

Students of botany are familiar with De Candolle's law by which xanthic flowers group themselves toward the tropics and cyanic flowers toward the circumpolar regions. When, several years ago, I began a close study of our southwestern hummingbirds I found in the geographical arrangements of the gorget and other display colors an elusive orderliness nothing short of surprising. Experimenters have so emphasized the spectrum in their color tests that the color wheel of the worker in pigments has been almost neglected.

In this color wheel, with some necessary distortion of proportions, the pigmented approximation of the spectrum may be imagined as wrapped about the dial of a clock with red at twelve, and the purplish hues joining the red through a series of crimsons between eleven and twelve. The scarlets will shade away on the other side and the counter-color of red will stand at six. The six major colors, red, orange, yellow, green, blue, and purple, will stand by the even numbers on the dial in their natural order, the intermediate shades, red-orange, orange-yellow, and the others, will stand in order by the odd numbers. Thus we travel from red to its counter-color, green, on one side through a xanthic series and on the other through a cyanic. Now, with a map of North America and our color dial we start at about 61° of latitude in Alaska and southern Yukon, and at about twelve on our dial, dropping continuously to the lower numbers in each case, though of course not proportionally, to find a surprising orderliness in the first appearances of the luminous display colors of the various species of hummingbirds.

Reds.—The most northerly ranging species, the Rufous Hummingbird (*Selas-*

phorus rufus) has the luminous display color scarlet, with orange-inclined or coppery hues, a decided inclination to the xanthic side. However, the purest red pigment that man can produce is inclined to retain this trace of yellowish impurity.

The next highest ranging species, the Ruby-throated Hummingbird (*Archilochus colubris*), if isothermally as far north is not latitudinally so, and its ruby gorget shows an inclination toward the purples of the cyanic side of the color dial. With the Allen Hummingbird (*Selasphorus alleni*), the two preceding species make up a great territorial arch about the dryer regions of the western part of the continent. The scarlet of the two western forms is better suited to contrast with the deep blues of the coniferous forests of the northwest; the ruby of the eastern species is better fitted for contrasting on the more yellowish background of certain eastern broad-leafed forests.

Within this arch comes another of entirely crimson hues, much lighter on the average, and better fitted for contrasting against a region largely covered with chaparral and grass. The most northern ranging species in this second rough arch is the Calliope Hummingbird (*Stellula calliope*), with rose-purplish display, and reaching as far north as British Columbia; next, into southern Idaho, the Broad-tailed Hummingbird (*Selasphorus platycercus*) ranges; while farther south and west we find the crimson pink gorget of the Anna Hummingbird (*Calypte anna*).

Purples.—A third northward-pointing arch, with the purple display band of the Black-chinned Hummingbird (*Archilochus alexandri*) reaches its highest in southern British Columbia. In the same color-group, the Costa Hummingbird (*Calypte costae*) reaches as far north as southwestern Utah, but the Rivoli Hummingbird (*Eugenes fulgens*), with its violet-blue or purplish, barely gets over our southwestern boundary, while the violet-purple of the Lucifer Hummingbird (*Calothorax lucifer*) seems to exceed it somewhat in territory occupied in the United States. The purple of the first, the amethystine of the second, and the violet-purple of Lucifer, leading to the violet-blue of Rivoli, indicates an approximately regular descent, not merely in colors but in hues! This we have clearly seen in the alignment of reds. The elusive pink that may flash at times from the gorget of the Costa makes one wonder if nature has been adapting it to contrast with the greener leaves of *Covillea tridentata*, the ranges of the two in the west being similar, both adding a wealth of color to the desert not found in the more northern reaches of the sober-hued sagebrush. Contrast evolution, if it has taken place, in such an environment might well be expected to interrupt an orderly appearance of hues, granting that our law of color can apply to such minute details.

Blues.—A metallic azure display color is found in the Blue-throated Hummingbird (*Lampornis clemenciae*), found in its subspecific forms in Arizona, New Mexico, and western Texas. Still restricting our arch, in an east and west direction more than a northward one, we have the Broad-billed Hummingbird (*Cynanthus latirostris*), in adjacent corners of Arizona and New Mexico. Elliot lists its display color as sapphire, and Bailey as peacock-blue, a hue reaching forward from the blue in the direction of green.

Greens.—We have noticed Rivoli already as occupying a position barely within the range of our United States species, the very last of the purples. But it also has a display gorget of metallic green. Now blue is our color midway between purple and green and this species with both thrusts itself northward in range into a region occupied by our most northerly blues. To meet a merely metallic green display alone we must push on farther south in the valley of the lower Rio Grande, to find it in the metallic green throat and breast of the Buff-bellied Hummingbird (*Amazilia yucatanensis chalconota*). Sufficient information is lacking to pass on the align-

ment of the hues of blue-green, green, and yellow-green, and as it is the most common color of hummingbird plumage with which we are now dealing there would be the risk of having passed, unnoticed, displays of green on the body of some other casually noted species. With green we reach the complementary or counter-color of red with which we started. Our Mexican boundary is a sort of dividing line between the cyanic displays at their farthest north, and the yellows at theirs. Elliot finds metallic greens of yellowish and golden tones in the next considered species.

Yellows.—Yellow in its purest form is probably best seen in lemon. And it is hard to imagine a metallic lemon or yellow. Our golds, coppers, and brasses, and our tinted tinfoils, will lean toward orange or toward green. In northwestern Mexico we encounter our first truly metallic golden display plumage in *Chlorostilbon auriceps*. Increased difficulties arise in the obtaining of workable descriptions of color displays and ecological backgrounds. Seeking intensification of our golden hues we pass farther south on the map, and farther toward orange on the color dial. Rivoli's purple-green display is soft indeed compared with the ruby-red crest and glittering topaz-yellow chin, throat and breast of the Ruby-topaz Hummingbird (*Chrysolampis moschitus*) of Venezuela and Colombia, even ranging according to Porsch and Sassi as far northward as the Lesser Antilles.

Oranges.—In the equatorial regions of Brazil, along the Rio Negro, we find *Topaza pyra*. Elliot described some individuals as showing orange-yellow displays while others showed orange-red.

How do these rules apply in the hemisphere to the south? As in the north, a yellow-tinged red reaches farthest from the equator in the display of *Eustephanus galeritus*. But as North America recedes from the equator it widens, while South America below that line narrows rapidly. At that place, where a sudden inward shrinkage appears on both coasts, we strike a narrow band, largely steppe and desert land, running from the La Plata valley, through Bolivia and Chile to southern Peru, from southeast to northwest. Here purples, blues, and greens all attain their most southerly reaches, and so telescoped and jumbled they seem until more detailed information is available, that we must wait, remembering, however, that the purple gorget of the Bolivian plateau may be isothermically farther from the equator than the green one at the mouth of the La Plata. Altitudes here run to as much as twenty thousand feet and more, dwarfing anything along our Mexican border. Yellow appears to attain limits rather behind this general boundary, but orange again loiters nearest the equator in the same genus already noted. From Colombia, through Ecuador and Peru into Bolivia we find species with the most variable color repertoires: Topaz, to flame or to emerald in *Iolaema luminosa* of Ecuador and Peru; in *Diphlogaena iris* of Bolivia, golden-green to orange scarlet and metallic blue with velvety black; in *Helianthea bonapartii* of Colombia, dark green, coppery red and purplish blue; and in *Bourcieria assimilis*, black with iridescence merging into metallic red to golden, the throat purple.

In contrast to these are the mere green forms, with no display colors, ranging well across the tropics, and probably the most primitive of the family, certainly ancient enough to have given us the two extremes of size in the family in the giant *Patagona gigas* of Ecuador, Bolivia, Peru, and Chile, and the diminutive *Mellisuga minima* of Jamaica and Santo Domingo. Perhaps the nearest approach to metallic white or metallic black is a silky or glossy for one and a jet or velvet for the other, unless for the first we wish to emphasize some of the silvery displays sometimes seen in the tropics. Black and white are probably as a rule merely contrast or framing colors. *Aglaectis pamela* of Bolivia, largely jet black, shows a tuft of pure white feathers on the jet black breast. White with gold spots, and white tipped by glossy

green, are seen in Mexico and Brazil, both in *Lophornis*; and in *Oxypogon* of Venezuela the black of head and crest shows a white line in the center and a bounding band of white, with a lengthened tuft or beard of white hanging from the throat.

In *Lophornis adorabilis* of Chiriqui in Central America a ruby-red forehead passes into a pure white crown, but in *Anthocephala floriceps* of Colombia a buffy white on the forehead yields to a peach blossom on the crown, while in *Microchera albocoronata* of Veragua both front and crown are of a silky white. The last is almost as small as the sole occupant of the genus *Mellisuga* with which it was once grouped. Silvery greens, and greens yielding silvery sheens, are shown by *Heliangelus spencei* and by *Heliotrypha barrali* of Venezuela and northern Colombia. These whites and silvery sheens it will be noted are found in countries at the southwestern corner of the Caribbean Sea. Perhaps albinism is involved in some forms now leaning toward the silky whites.

Cinnamon, buff and rufous evidently make contrasting and harmonizing settings, and are found ranging far along the Pacific side of the Americas. In *Lophornis* of Venezuela various species show crests of rust red, of rufous, of deep chestnut, or of chestnut red as if to contrast the metallic green, in some on the forehead, in some on the throat, or perhaps spotting or tipping the feathers that spring, racquet- shaped, in tiny tufts from the side of the neck. But we must not carry the idea of contrasts too far as to plumage, and far less as to landscape. The Rufous Hummingbird appears to seek color harmony in its plumage rather than color contrast, but thereby it attains even greater contrast with its environment of bluish-green conifers when among such.

To summarize: Any and all colors of display plumage are to be found among hummingbirds in the deeper tropics. In their northward ranges, possessors of these colors tend to drop out in the following order: Oranges, yellows, greens, blues, purples, and reds, a similar arrangement to that found on the pigment wheel of the colorist. A similar order is *indicated* in the southern hemisphere.

As De Candolle found the xanthic flowers more tropically inclined and the cyanic more nearly circumpolar, the xanthic or yellowish hues of display plumage tend to drop out in the tropics, while the bluish hues extend farther into the temperate zones. In each hemisphere, however, the species reaching farthest from the equator shows a yellowish or xanthic red in its display plumage, rather than a bluish or cyanic.

Greenville, South Carolina, August 7, 1934.

A HISTORY OF THE BIRD COLONIES OF GREAT SALT LAKE

WITH MAP

By WILLIAM H. BEHLE

There are four breeding colonies of water birds on the islands of Great Salt Lake, each situated on a different island. The four islands vary considerably as to size and the number of avian inhabitants. The colony which is most widely known, though not the largest, is located on Bird Island (local name, Hat Island on most maps). This island is roughly circular in form and about 150 yards in diameter except for a sand bar extending southward for several hundred yards. Back from the beach the surface of the island is fairly level for several yards and then rises gradually to the rugged rocks which form the summit of the island, some 75 feet above the water. Scattered about are greasewood bushes (*Sarcobatus vermiculatus*) and other desert shrubs. These bushes are largest near the beach where they are five to seven feet tall. Much of the open space on the island is rocky, but a large

part is sandy or gravelly. At the nesting time of the birds the island abounds with flies, beetles, and spiders. A few whip-tailed lizards (*Cnemidophorus tessellatus*) are found there. Hat Island is approximately thirty miles northwest of Saltair and is northernmost of a series of three islands on the west side of the lake. It is so low as not to be observable from any point on the east shore of the lake.

The largest of the colonies is on Gunnison Island which is the largest of the bird-inhabited islands. The average height of this island above the water is about one hundred feet, and the shore line is about three miles in extent. Between a centrally located peak and the abrupt cliff on the north, there is a low saddle which slopes off gently to bays on either side. The nesting grounds are located on both sides of this saddle. The nesting area is free from rocks but, as on Hat Island,

Fig. 6. Map of Great Salt Lake showing the location of its islands, including those utilized as nesting sites by colonies of birds.

it is clothed with desert shrubs. On the island are brown-shouldered lizards (*Uta stansburiana*) and white-footed mice. Gunnison Island is about sixty-five miles northwest of Saltair. It lies north of Lakeside and approximately five miles from the railroad trestle at this point and some twenty-five miles from Promontory Point.

Egg Island, the third largest nesting place, is situated about half a mile north of the extreme northern tip of Antelope Island, which island is the largest in the

lake. Egg Island seems to be a rocky projection from the water-covered ridge extending north from Antelope Island. The nesting area here is small in comparison with those of the two previously mentioned colonies. It is oval in shape, about fifty yards long and forty yards wide. It is simply a jumbled mass of quartzite boulders of all sizes; the largest of these is at the north end. This island is the type locality of the Treganza Great Blue Heron (*Ardea herodias treganzai*). The island is barren of all vegetation, but the built-up nests of the herons and cormorants give the surface a peculiar appearance. The entire area is, at the present writing, but a few feet higher than the water. No vertebrate life other than birds exists on the island. The nests, however, contain countless insect larvae and beetles, and spiders are numerous.

Near the north end of Antelope Island, and on its west side, there is a deeply indented bay known as White Rock Bay from a large white rock in its center. It rises out of the water vertically on all sides except the east one, where a landing can be made. Its summit is about thirty feet above the water. On top, this mass of rock is about twenty-five yards long and ten yards wide. A good part of it is bare and sloping, but at the south end an area of about twenty square yards is available for nesting sites. Here, rough, hollowed spaces hold guano deposits and make flat surfaces for nesting sites.

There are indications that two other islands have been used in years past as nesting sites. Ridgway (1877, p. 371) mentions a colony of birds nesting on Carrington Island. Cormorants were reported as nesting on Dolphin Island about 1919 (Lewis, 1929, p. 7). Neither of these sites was used in 1932 and probably had not been for many years. Carrington Island is much larger than any of the other bird-inhabited islands, being about a mile across. It is situated four miles south of Hat Island. Dolphin Island is the farthest north of all the islands, being located eleven miles north of Gunnison Island.

In 1932, White Pelicans (*Pelecanus erythrorhynchos*), Treganza Great Blue Herons (*Ardea herodias treganzai*), and California Gulls (*Larus californicus*) were found nesting on Hat Island. These three kinds were also found nesting on Gunnison Island. At Egg Island were nesting California Gulls, Treganza Great Blue Herons, and Double-crested Cormorants (*Phalacrocorax auritus,* subspecies?). The White Rock colony was composed of California Gulls.

As near as can be determined from my observations and those of others, all the kinds of birds that nest on the islands are seen in the region in considerable numbers by the last week in April of each year. It seems that the birds, or at least the pelicans, reach the islands in several flights at different times. If this is not so, then the time of laying of small groups differs considerably. On May 1, 1932, at Hat Island, most of the pelicans seemed to be in the egg laying stage, but one group of about twenty-five nests contained eggs that were mostly pipped. A few of these hatched that day. From this we infer that some pelicans arrive as early as April 1, but most seem to enter the region later. On Gunnison Island, June 29, 1932, the majority of pelican young were three-fourths grown. One group of nests contained eggs, while other groups had young some ten days old. It is possible that each group of pelicans represents a single strain or stock and that the colony is made up of birds reaching the island not only at different times but from different wintering grounds. On May 1, 1932, many adult pelicans were shedding the horny excrescence of the upper mandible.

The Treganza Great Blue Herons seem to be the earliest of the birds to nest, since on May 1, 1932, at Hat Island, young were found about two weeks old. Fresh eggs and newly hatched young were also noted at this time. It appears that some

cormorants start laying about the last of March, while others continue to lay eggs after the middle of May. My earliest visit to Egg Island was on May 18, 1932, at which time a few fresh cormorant eggs were being incubated and young of all ages up to about three weeks were seen. On Egg Island, June 25, 1934, most of the young were full grown, but three nests in a group all contained eggs still being incubated. As to the gulls, mostly fresh eggs were found at Hat Island, May 1, 1932, only ten or twelve chicks being seen. It is my impression that the gulls lay their eggs at a more uniform time. I have not noted eggs, nestlings and juvenals all at one time, as I have with the other kinds of birds on the islands.

A number of eggs collected on the islands by different people during several years were measured, as follows. Figures in italics indicate the extremes of these measurements. Nineteen heron eggs from Hat and Egg islands averaged 64.4 by 45.2 millimeters; the eggs showing the four extremes measure *70.5* by 46.5, 70.5 by *46.5*, *58.5* by 44.8 and 68.8 by *43.0* millimeters. Fifty gull eggs from Hat Island averaged 64.8 by 44.8 millimeters; the eggs showing the four extremes measure *72.0* by 44.7, 67.3 by *48.1*, *57.6* by 45.3 and 62.0 by *41.4* millimeters. Twenty cormorant eggs from Egg Island averaged 59.3 by 37.1 millimeters; the eggs showing the four extremes measure *64.0* by 37.2, 58.1 by *39.4*,*53.0* by 36.3 and 62.2 by *34.8* millimeters. The measurements of fifteen pelican eggs from Hat Island average 87.0 by 56.9 millimeters; the eggs showing the four extremes measure *97.0* by 56.0, 86.3 by *66.4*, *77.6* by 58.0 and 93.1 by *54.4* millimeters.

Colonial partition and other nesting features on the islands are interesting. One finds the center of Egg Island occupied by herons and cormorants. The nests of the cormorants are in one group and those of the herons in another. Yet one may find a few of the larger, heron nests within the cormorants' territory. The nests of both of these kinds of birds are built on and between large boulders. Those of the herons are low and wide, with some measuring three and one-half feet across on top. The nests of the cormorants are all over a foot high and some have reached a height, through the years, of twenty-two inches from base. This height is close to the greatest reported by Lewis (1929, p. 31). On Hat Island the pelicans inhabit a strip of rather level ground on the northeast and east portions of the island. The herons of recent years have chosen the bushes on the north and east sides only. Some of their nests have been utilized and remade year after year until now the bushes present a solid appearance from the ground up. A man's weight is easily borne by the interwoven structure. Under crowded conditions the rocky portions of the island were evidently utilized, because remains of nests were seen there. Evidence of the durability of the nests of herons is shown by the fact that on White Rock were found in 1932 seven of the eight nests that Treganza (Court, 1908, pp. 292-93) reported for the years 1905 and 1906. Eroded and weather beaten, they are now used by gulls.

At Gunnison Island the pelican colonies are more scattered than at Hat Island. Colonies were found on both sides of the saddle. That pelicans return to the same sites on this island was indicated by the pavement of excrement in some places, which stood out in contrast to surrounding dirt areas. The heron nests were all confined to one rocky projection near the center of the saddle. On all the islands gulls occupied available spaces not utilized by other kinds of birds. Some eggs were found on bare rock, but most were in depressions on the ground. Some of these nests were bare, others sparsely lined with sticks, feathers, and bones. That California Gulls will build bulky nests when material is available was shown at Rock Island, Utah Lake, where nests several inches high were found.

It is a well known fact that no fish live in the waters of Great Salt Lake. But

to say that no food for the birds is furnished by the lake is untrue, because I have frequently seen flocks of gulls floating on the surface of the water feeding on brine shrimps (*Artemia fertilis*). But the gulls as well as the other birds must fly great distances to their more productive foraging grounds, such as newly ploughed fields, river banks, garbage dumps, and school grounds. When Salt Lake City schools are in session flocks of gulls gather around the buildings waiting for scraps from the children's lunches. Several janitors have reported that the gulls come regularly five days in the week but remain away Saturdays and Sundays, when there are no classes! Of recent years some complaint has been made by farmers of Davis County that the gulls are damaging their cherry crops. As evidence that this is true one can see countless cherry stones around the nesting sites. I am told that gulls flop down in the tops of cherry trees with outspread wings so that their weight is largely wing-supported and then proceed to devour all the fruit within their reach. The herons forage principally in sloughs bordering the lake or in the marshes at the mouth of the Bear River. Here, in characteristic fashion, they obtain fish, frogs, and the like, for their bill of fare. Cormorants, when fishing, seem to frequent Utah Lake and the Bear River marshes chiefly, but also are seen at other sloughs in the valley.

Pelicans subsist almost entirely on fish, the type eaten being determined by the kinds present in the breeding region. Where sluggish, more-easily-caught, non-game fish are present, this type is utilized almost exclusively. When these are not obtainable, trout and other game fish are preyed upon, as at Yellowstone Lake. The lakes and rivers in the Great Salt Lake region abound in non-game fish. Utah Lake, about thirty-five miles south of Great Salt Lake, has been for years particularly over-run with carp, and has furnished most of the food for the pelicans. Nearly always, in spring and summer months, has one been able to see great flocks of pelicans near the mouth of Provo River.

Fishermen and fish culturists seem to be desirous of getting rid of all fish-eating birds, while ornithologists and conservationists are anxious to preserve these same birds, no matter to what extent fishes are levied upon. As a result there is a never-ending controversy over the fish-eating propensities of the birds. While it is not my intention to discuss this here with regard to pelicans, I do want it known that in 123 regurgitated piles of food that have been examined on the islands by me not a single recognizable trace of trout was found. Carp of various sizes made up the bulk of the indentifiable remains. Occasional perches, chubs and suckers were also present. By making great inroads on the numbers of carp in Utah Lake, more good than harm has been accomplished by the birds. The detrimental effects of carp in destroying vegetation and making the lake unsuitable for other types of fish is well known. It seems, then, that "control" of pelicans, or their persecution, in this region has been and is without justification.

The only control measures that I know of on any of the islands occurred during the nesting season of 1918. Representatives of the state department of fish and game journeyed to Hat Island and, according to Charles G. Plummer who visited the island less than a week later, they shot and clubbed to death literally hundreds of young and adult pelicans and nearly the entire population of herons. According to the Utah fish and game laws "the blue and black-crowned night heron and pelican may be destroyed under regulations made by the commissioner."

Speaking of the economic bearing of these birds, one should mention the fact that attempts have been made to sack guano from the islands for fertilizer. Part of Gunnison and Hat islands have been privately acquired by means of mineral patents in connection with these enterprises. However, torrential rains wash most of the deposits into the lake each year and now all the ventures have been abandoned.

In July, the brine flies (*Ephydra gracilis*) appear in swarms on the islands and elsewhere about the lake. In places the rocks are black with them. I have seen gulls stir them up with their wings and then gather in mouthfuls as fast as they were able to open and close their mandibles and swallow. As the summer draws to a close there seems to be less and less activity on the islands, at least as far as the birds are concerned. Eventually the birds wend their way southward again, just when is not known. The guano and filth make the nesting sites well suited for flies (Muscidae) and they exist there in great numbers. The spiders, which reside in crevices and under driftwood, seem to become more noticeable after the birds leave. In late August and September, Hat Island presents a silvery sheen from countless spider webs. Presumably the flies are fed upon by the spiders, while the lizards prey upon both flies and spiders as means of sustenance. Crippled birds remain on the island until they starve to death. Often there are hundreds unable to fly because of injuries suffered when young, from being trampled or from being attacked by vicious adults. Their remains are used the next spring as nest building material.

Man's visits to the islands during the nesting season are most always detrimental to the pelicans' welfare. The following incident illustrates this. On May 22, 1933, a large party of sightseers was forced to remain nearly twenty-four hours on Hat Island. Emil Johnson, Salt Lake boatman, had visited the island about a week before the marooned party was there and found hundreds of nests containing eggs and young just hatched. On a second trip, May 30, 1933, he noted only a few half-grown pelicans and some newly-laid eggs. Presumably the adult pelicans were kept away from their nests for several hours by the marooned party, thus allowing the gulls to pillage eggs. Many young pelicans probably died from exposure to the sun. I have witnessed mortality from this cause during my own short visits. When the water level was much higher and boats could be operated, excursions were frequently made to the nesting grounds. The Gunnison Island colony has suffered the least from sightseeing parties, because of its remoteness.

The environmental set-up that pelicans seem to require for nesting is a low tract of terrain surrounded by water. The water level of Great Salt Lake has dropped so greatly during the last few years that it is now at the lowest stage recorded. The lake bed west of Hat Island is exposed to such an extent that one could walk out to the island on exposed sand bars. It may be that this condition has affected, or will affect, the pelican colony there.

Pumping operations together with drought reduced Utah Lake in the summer of 1934 to an extremely shallow depth. High winds throughout the summer swept the shallow water back and forth across mud flats, leaving thousands of fish stranded. Should a hard freeze-up occur this winter the remaining fish in the lake may be annihilated. It remains to be seen how this curtailment of the most important food source in the region will affect the pelicans. Some may leave the region. There may be an extension of their cruising radius for food. It is possible that game fish may be levied upon. I can conceive of little being done in a practical way to help out the food situation, but something can be done to safeguard the pelicans of the region and that is to give the birds state and federal protection and include the nesting sites in a bird sanctuary. This would discourage future sightseeing trips and slaughters.

First records of any bird life on the islands are to be found in the report of Captain Howard Stansbury (1852) on the exploration and survey of the Great Salt Lake which was carried on in 1849-50. No specific numbers of the different kinds of nesting birds are given; rather the term "thousands" is used. Dolphin Island

receives considerable attention in connection with camps established there and the erection of a triangulation station, but not once is any mention of birds made. We assume that the island was then uninhabited. No mention of bird life on Hat (Bird) Island is made although Stansbury (1852, p. 162) relates that the island was covered with a species of wild onion and that there were interesting slate outcroppings. Surely he would have described the birds there if they occupied the island as they do today. White Rock is not discussed in the account. Considerable space is devoted to the birds on Gunnison Island where pelicans and gulls were found. Stansbury notes the location of the nesting colonies on Gunnison Island as being on the shores of both bays and on the neck of land between them. This is where the birds were nesting in 1932.

Reading through Stansbury's daily account of his activities the following passage is one of several that may be found pertaining to Egg Island. Under the date May 20, 1850, he records (p. 188) in his journal: "Before we passed around the point of Antelope Island, we stopped for a few moments at the little islet near it, where the number of gulls and pelicans was, if possible, greater than we had seen on Gunnison's Island. The whole islet was covered with eggs, chiefly those of the gulls, and with innumerable young birds, just hatched, ..." This passage can only refer to Egg Island which is so located and not to Hat (Bird) Island, as Thompson (1933, p. 46) has inferred. Stansbury mentions finding young herons, pelicans and cormorants on Egg Island amid the colony of gulls. We conclude from Stansbury's account that in 1850 there were only two colonies of significance, namely, those on Egg and Gunnison islands. Dolphin and Hat islands were uninhabited. White Rock may have been utilized. It is interesting to read that on several occasions eggs proved an important source of food for the party.

Searching through the literature after Stansbury's report I have been able to find no further reference to the colonies until we come to the report of J. A. Allen (1872a) on the ornithological results of an expedition of which he was a member, to the plains and Rocky Mountains in 1871. His party was in Great Salt Lake Valley from September 1 to October 8, 1871. The following excerpt, among others, refers to the colonies (Allen, 1872a, p. 401): "The Delaware gull or its western representative, is a numerous summer resident, breeding on the islands in great numbers." Today *Larus delawarensis* is only found in the region during the autumn and winter months and does not breed on the islands. The nesting gulls (*Larus californicus*) move out of the region some time in August or earlier. Allen may have seen only winter visiting gulls and concluded from Stansbury's references to the nesting of gulls on the islands that *Larus delawarensis* was the breeding gull of the region. Stansbury apparently did not collect any gulls, since no mention is made of gulls in Baird's report on his collections. Very possibly *Larus californicus* was not accepted as a distinct species by Allen, Nelson, and others, and may have been regarded as a variety of *Larus delawarensis*. I see no reason why the gulls of the islands now should be any different from those during the years of Stansbury's or Allen's visits to the region. Allen mentions Cormorants, White Pelicans and Great Blue Herons being found in the region. Herons were rather common.

E. W. Nelson observed birds around Salt Lake City between July 27 and August 8, 1872, and records (1875, pp. 348-49) that White Pelicans were common in flocks and gulls (*Larus delawarensis*) were abundant at the mouth of the Jordan River. Possibly he was influenced by Allen's report as to the status of the gulls.

A number of short notations during the next few years gives some indication that the colonies perhaps were detrimentally affected by the advent of man into their region. These early references, however, pertain to the White Pelican. Coues

(1874, p. 586) in discussing the White Pelican says: "It formerly bred in immense numbers about Great Salt Lake, where it has decreased in abundance of late." Henshaw (1875, p. 485), dealing with pelicans, writes: "In Stansbury's report of Great Salt Lake, mention is made of large numbers of these birds being seen in the lake, they breeding in the islands thereof. In July, but few were seen and we are informed they no longer breed there. These birds were seen at Utah Lake late in July sparingly and on the sloughs of the Sevier." In a later publication Henshaw (1879, p. 329) while discussing clubbing and slaughter of pelicans says: "Such is the case at Great Salt Lake where the former great abundance of the pelican is attested by all the early explorers, but where now the bird is known only as a casual visitant."

It has been thought that relentless persecution caused this apparent decrease in numbers by 1875. An even greater factor was probably the high water level throughout the 70's. In 1873 the lake reached the highest level ever recorded and this was roughly eleven feet higher than during Stansbury's survey and sixteen feet higher than today (November, 1934). This means that Egg Island was almost completely covered, as also a good part of the available nesting area of Hat Island. Gunnison Island must have had its breeding area somewhat diminished but not to such an extent as on Hat Island. White Rock would be little affected.

That the birds probably nested on Carrington Island during the high water years is shown by Ridgway's recording (1877, p. 371) that two members of his party visited this island bringing with them on their return, eggs of *Recurvirostra americana, Branta canadensis,* and *Larus californicus.* They reported various other waterfowl as breeding on this island and a smaller one nearby which undoubtedly refers to Hat Island. The inference is that the birds used what available space there was on Hat Island, the unprovided-for birds retiring to the larger island.

In 1908, Court (1908, pp. 291-292) described a new subspecies of Great Blue Heron, calling it *Ardea herodias treganzai* in honor of A. O. Treganza, then of Salt Lake City, who furnished him with a specimen from Egg Island. This specimen was chosen as the type. Accompanying Court's description are Treganza's notes pertaining to the herons on the islands. On May 15, 1905, at White Rock he found eight pairs of herons breeding. The following year the same number of nests was found and all were occupied. The herons were nesting with *Larus californicus,* but no mention is made of the number of gulls. On Hat Island, May 8, 1906, there was a colony of forty pairs nesting in company with *Larus californicus* and *Pelecanus erythrorhynchos.* No numbers are given for these last two kinds. September 10, 1907, on Hat Island, all the birds had left, but a great increase in the number of herons' nests was noted. At Egg Island, May 11, 1906, fifty breeding pairs of herons were nesting in company with California Gulls and cormorants. On May 16, 1907, he recorded that seventy-five pairs nested there, an increase of fifty per cent over the previous year. As to Gunnison Island he states that Captain Davis reported that the herons nested more abundantly there than on any other island in Great Salt Lake.

On May 14, 1915, R. H. Palmer (1916, pp. 113-123) found at Hat Island about 2000 White Pelicans, about 8000 California and Ring-billed gulls, about 400 Treganza Great Blue Herons, and 50 Caspian Terns. The figure for the gulls was based upon the number counted in a photograph, but Palmer also states that other estimates ranged from 15,000 to 20,000. I am inclined to doubt that Ring-billed Gulls ever nested on the islands, since no specimen has been collected there, and as previously stated their presence in the region is known only in winter. Palmer's article contains the only record of Caspian Tern breeding on any of the islands. However, Treganza (in letter) tells me he found about 15 pairs breeding on Hat

Island on several occasions prior to 1920. A colony of these birds was visited by me on Rock Island, Utah Lake, on June 1, 1932, and may represent the descendants of the colony that once nested at Hat Island.

As to Egg Island, Palmer after describing it and mentioning herons and gulls says (1916, p. 123): "The special object of interest and also of our visit to this island was the Double-crested Cormorant (*Phalacrocorax auritus auritus*). Of these there were between five and six hundred individuals on and around the island." There is doubt as to the subspecific identification of the cormorants of Great Salt Lake. Lewis (1929, pp. 7, 9, 10) lists the Great Salt Lake cormorants under *P. a. auritus*, but his information probably came from Palmer's article, since this reference is included in Lewis' bibliography. The A. O. U. Check-list indicates that the Great Salt Lake cormorants are *P. a. albociliatus*. Measurements do not seem to offer adequate means for differentiating between the two races. About the only distinguishing feature is that *P. a. albociliatus* has white nuptial plumes while *P. a. auritus* has black ones. Palmer does not mention the plume character and I am inclined to think that his visit was rather late for the nuptial plumes to be seen, since they wear off early in the season. All specimens collected in the region and examined by me, or inquired about, lack the plumes. The actual subspecific identity remains undetermined.

Allee (1926, p. 492) visited Hat Island in July, 1915, about two months after Palmer did. His estimates ran much higher than Palmer's for the gulls and about the same for the pelicans.

Sugden (1926, pp. 142-146) reported after his trip on May 17, 1925, that there were thousands of California Gulls and what were supposed to be Ring-billed Gulls, but the members of the party couldn't tell the difference. Great numbers of pelicans were noted. No Caspian Terns were seen. Of herons he says (1926, p. 144): "Only the old nests of the Great Blue Heron . . . marked the former nesting sites and but one bird was noted on the wing." The following year, on May 9, 1926, Sugden (1927, p. 47) again visited the island, finding six adult herons on the island and three of that year's nests. California Gulls were as plentiful as before, but there had been a decided increase in the number of pelicans. The flock was larger and the nesting grounds covered a larger area.

In Lewis' (1929, p. 7) table on the breeding colonies of *Phalacrocorax auritus auritus* he gives 50 pairs for Egg Island and 75 pairs for Dolphin Island. A colony of 200 pairs is also noted for Bear Lake, Utah. All this information was supplied by Treganza in a letter some time in 1929. Observations were made, however, about 1919. This is the only information I have been able to find showing that Dolphin Island has been used as a nesting site by a colony of birds. Regarding the status of the Bear Lake colony, the only specific information I have obtained comes from Mr. Lynn Hayward. On June 15, 1928, he found 118 nests containing eggs heavily incubated. On May 29, 1929, he counted 200 nests.

Thompson (1933, p. 48) gives an estimate of over 4000 adult White Pelicans at Hat Island on May 15, 1932, and about 1500 occupied pelican nests. Assuming that half the colony of pelicans was away foraging, it was estimated that approximately 8000 adults were in the Hat (Bird) Island colony in 1932. Assuming that pelicans nested on Gunnison Island, the figure for the region was placed at 10,000.

It was this same year that I was able to make a complete survey of all the islands and take nest counts and censuses. My first visit to Hat Island was made on May 1, 1932, and regular visits throughout the summer were made about three weeks apart. At no time were more than 2000 pelicans seen at Hat Island. The pelicans were counted through the glasses as they floated on the surrounding water. Nest counts

for the pelicans totaled roughly 1500. Allowing two birds per nest this would make a figure of 3000 birds. Or doubling the estimated 2000 on the basis that half the pelicans were away foraging there would be 4000 birds. This last figure I considered as a reasonable estimate for the pelican population of the island. At Hat Island thirty herons were counted and it was estimated that there was a breeding population of 20,000 California Gulls. Estimates as to the gull population were made by counting the adults at rest in a small measured area and comparing this with the total area. The figure thus reached was then doubled to allow for absent birds and those in flight around the island. No attempt was made to count juvenals.

A visit to Gunnison Island, June 29, 1932, revealed an estimated California Gull population of 60,000 adults. An actual nest count showed 3300 White Pelican nests and 16 Great Blue Heron nests. On the basis of two birds per nest I have placed the population of the pelicans at 6600 and of the herons at 32, these being, I think, conservative figures; and they do not include possible non-breeding birds. Egg Island in 1932 supported a population of 1200 California Gulls, 32 Treganza Great Blue Herons and 100 cormorants. The White Rock colony was composed of gulls to the number of 500.

There were then, according to my figures, breeding on the islands of Great Salt Lake in 1932 some 80,000 gulls, 10,600 pelicans, 96 herons and 100 cormorants.

Dolphin Island was also visited that year. It was not then being utilized nor was there any evidence found to indicate that it had been used in recent years. No cormorant nests or remnants of nests were found. Judging by the solid structure of the nests on Egg Island, Dolphin Island has long been unoccupied. Carrington Island also was uninhabited by birds in 1932.

The only information I have been able to obtain about the 1933 nesting season pertains to the cormorants on Egg Island. Moving pictures taken there by Dr. Sugden about the second week in June show 65 young cormorants gathered in one large group in the water around the island. They seemed unable to fly and undoubtedly represented all the surviving offspring for the season.

In the summer of 1934 I attempted to revisit the islands. It was a particularly windy season and efforts to reach Hat Island invariably failed. It was not until June 25, that Egg Island was reached through the courtesy of Dr. T. C. Adams, whose sailboat was employed. The breeding season was almost over. The adult cormorants and herons immediately departed as we approached, but eight herons were counted before they had disappeared. Ten of the heron nests showed evidence of use for the season. Twenty-five young cormorants were seen in the water around the island. Most of these were fully grown but not able to fly. I feel sure that these represent the entire yield of the colony. About 35 of the nests of the cormorants appeared as if they had been used that season. The presence of many skeletons in the cormorant nests showed a high mortality of young. Figuring on the basis of two adult birds per nest we would get a probable breeding population of 70 cormorants and 20 herons. I realize that computing population figures from nest counts is not entirely satisfactory; still it presents about the only available method under the circumstances. Because of heavy winds we were unable to land at White Rock, but in circling it only gulls were noted there.

CONCLUSIONS

1. The four species of birds first reported to nest on the islands in Great Salt Lake, namely, White Pelicans, Double-crested Cormorants, Great Blue Herons and California Gulls, continue to do so.

2. The present colonies are to be rated as among the largest in North America.

3. In view of the general decline in the numbers of White Pelicans the country over, the Great Salt Lake colonies seem to have held their own down through the years and they may even have increased in numbers. Food shortage and the connection of Hat Island with the mainland by sandbars may greatly reduce the pelican population of the general region.

4. The Great Blue Herons have been seriously reduced in number. A high figure was reached in 1915, when 400 were reported nesting on Hat Island alone. They reached a low figure in 1925, when no nests at all were found on that island. In 1932 there were not more than 96 on all of the islands. Indications of still further reduction in 1934, were shown on Egg Island.

5. Seventy-five pairs of cormorants nested on Dolphin Island about 1919, but this site has not been used in recent years. In 1915, 500 were reported on Egg Island. Only 100 nested there in 1932, and indications are that but 70 individuals were breeding there in 1934.

6. Gulls have always been reported by the thousands and seem to suffer the least from fluctuating lake levels and visits of man. Their presence may be considered as menacing to the other birds, especially at times when man's presence results in disturbance of the colonies.

7. The rising and lowering of the lake level has undoubtedly been a factor affecting the colonies. During extremely high water Egg Island has been inundated and the breeding areas of Hat and Gunnison islands reduced. At extremely low levels of the lake, as obtain at the present time, some of the islands become connected with the mainland.

LITERATURE CITED

Allee, W. C.
1926. Some interesting animal communities of northern Utah. Scientific Monthly, 23, pp. 481-495.

Allen, J. A.
1872a. Ornithological notes from the West. Amer. Nat., 6, III. Notes on the birds of the Great Salt Lake Valley, pp. 394-404.
1872b. Notes of an ornithological reconnoissance of portions of Kansas, Colorado, Wyoming, and Utah. Bull. Mus. Comp. Zool., 3, pp. 113-183.

Coues, E.
1874. Birds of the northwest. U. S. Geol. Surv., Misc. Publ. No. 3, pp. xi + 791.

Court, E. J.
1908. Treganza blue heron. Auk, 25, pp. 291-296, pls. 5-6.

Henshaw, H. W.
1875. Report upon the ornithological collections made in portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona, during the years 1871, 1872, 1873, and 1874. Rept. Geog. and Geol. Expl. and Surv. West 100th Meridian, George M. Wheeler in charge, 5, zoology, Chap. III, pp. 131-507, pls. 1-5.
1879. Ornithological report from observations and collections made in portions of California, Nevada, and Oregon. Appendix L, Ann. Rept. Chief Engineers for 1879, Ann. Rept. Geog. Surv. West 100th Meridian, by George M. Wheeler, pp. 282-335.

Lewis, H. F.
1929. The natural history of the double-crested cormorant (*Phalacrocorax auritus auritus* (Lesson)). Ottawa, Canada, pp. 1-94.

Nelson, E. W.
1875. Notes on the ornithology of Utah, Nevada and California. Proc. Boston Soc. Nat. Hist., 17, pp. 338-365.

Palmer, R. H.
1916. A visit to Hat and Egg islands, Great Salt Lake. Condor, 18, pp. 113-123, figs. 35-39.

Ridgway, R.
1877. Ornithology, *in* "Ornithology and Palaeontology", U. S. Geol. Expl. Fortieth Parallel, 4, Part 3, pp. 303-669.
Stansbury, H.
1852. Exploration and survey of the valley of the Great Salt Lake of Utah. (Philadelphia, Lippincott, Grambo and Co.), pp. 1-487, 23 plates, 35 figs. in text, 2 maps.
Sugden, J. W.
1926. Bird Island, Great Salt Lake. Oologist, 43, pp. 142-146.
1927. Bird Island, Great Salt Lake. Oologist, 44, p. 47.
Thompson, Ben H.
1933. History and present status of the breeding colonies of the white pelican (*Pelecanus erythrorhynchos*) in the United States. U. S. Dept. Interior, National Park Service, Contribution of Wild Life Division, Occasional Paper No. 1, pp. 10 + 82 + 4, 3 text ills; my copy received August 5, 1933.
Woodbury, A. M., and Behle, W. H.
1933. The bird rookeries of the islands of Great Salt Lake. Proc. Utah Acad. Sci., 10, p. 165.

Museum of Vertebrate Zoology, Berkeley, California, November 15, 1934.

FROM FIELD AND STUDY

Another Invasion of Wood Ibises in Southern California.—It may be that, after its nesting season, the Wood Ibis (*Mycteria americana*) visits Imperial County, California, every summer. But its appearance in San Diego County or the western part of southern California seems to be at intervals—determined, doubtless, by water conditions elsewhere. In the Condor (33, 1931, p. 29) I have recorded visitations of Wood Ibises to coastal San Diego County in 1923, 1925 and 1930. The year 1934, marked by a particularly notable invasion of these conspicuous birds, may now be added.

Considerable correspondence on the subject of this past summer's visitation was received at the Natural History Museum, San Diego, as well as many verbal reports of observations. The earliest record was June 10, from the caretaker of Hodges Reservoir, the latest September 28 when the local game warden stated that the birds were still at both Sweetwater and Hodges reservoirs. Almost every body of water in San Diego County seems to have had its Wood Ibis visitors. In addition to the two reservoirs just named, occurrences were reported at Lindo Lake, Lower Otay Lake, Henshaw Lake, Cuyamaca Lake (elevation 4600 feet), Guajome Pond, Chollas Reservoir, and various coastal sloughs from Torrey Pines to Oceanside. Even the band leader of the U. S. Marines wanted to know the name of the large white birds, with black on their wings, which he had seen between the parade ground and San Diego Bay. On the other hand, the caretakers of Barrett, Morena and Wohlford lakes, which are rather deep, mountain reservoirs, wrote that they had failed to see any of the ibises there.

The largest count was that of L. M. Huey, of the Natural History Museum staff, who tallied 77 individuals at Lindo Lake, Lakeside, on August 12. This small, shallow lake was a favored resort of the ibises throughout their stay. The characteristic unconcern of the birds was remarked upon by many persons who watched them at close range there. During a rodeo which was held in Lakeside on September 2 and 3, a number of ibises perched in a tree which was in full view of the grandstand and attracted considerable attention.

Supplementing observations in San Diego County, Professor Raymond B. Cowles, of the University of California at Los Angeles, wrote me that on August 13 he had seen 5 Wood Ibises flying above the salt lagoon at Point Mugu. He stated that they later settled in the salicornia at the edge of the water about a mile northwest of Fish Camp. Both of these localities are in Ventura County, and they provide the northernmost record for this visitation that has come to my notice. Dr. Loye Miller, of the University of California at Los Angeles, wrote: "We saw wood ibises in early August

at Balboa [Orange County] on several occasions. We counted about thirty."—CLINTON G. ABBOTT, *San Diego Society of Natural History, Balboa Park, San Diego, California, November 19, 1934.*

Nesting Habits of Cormorants.—On the cliffs above the famous Caves of La Jolla, California, there is a long established cormorant nesting ground. These cliffs rise almost sheer from the sea and are battered by the breaking surf along the base. Along the rough face of this cliff for a distance of perhaps 200 yards are niches, ledges, and projections which offer perching and nesting sites for the cormorants. When we first visited this rookery at the end of October, 1933, several hundred birds were present and every available perching site was in demand. Of the estimated 600 cormorants on the cliff 500 were Brandt Cormorants (*Phalacrocorax penicillatus*) and 100 were Farallon Cormorants (*Phalacrocorax auritus albociliatus*).

While all the cormorants perched on the same cliff, the birds of the two species did not mingle indiscriminately: the Farallons occupied the uppermost tiers of perches exclusively while the Brandts kept to the ledges below the two uppermost tiers. Each species recognized the rights of the other and there was never any apparent dispute between species. However, birds of the same species often dislodged one of their own kind to gain a favored perching site. As a matter of fact there were not enough perching sites to accommodate all the Brandt Cormorants, and as a consequence many were forced to do their resting on the surface of the sea. But nesting birds had well established rights, for they were never molested by birds who sought a foothold on the cliff.

At the time of our first visit and all through the month of November the cormorants were merely using the ledges as perching sites, but on the afternoon of December 21, on our visit to the rookery we discovered Brandt Cormorants just beginning to build nests. These birds were in breeding plumage and from the sides of the neck and from between the shoulders there extended long narrow plume-like feathers. Excited birds puffed out blue throat pouches.

The nest building activities of these cormorants was an elaborate ceremonial, and in two cases at least it seemed to be a three bird affair. Two birds stayed at the nest site to arrange the material which a third bird, the carrier, brought in from the sea. When the carrier came in from the sea with a billful of seaweed he came flying low over the water; with fast beating wings as he approached the cliff he lifted upward and then with an awkward flop he alighted clumsily on the nest ledge. When settled, he bows with grave dignity and places his offering of material at the feet of his lady. Now there is much politeness. The birds raise high their heads in turn, and bow to one another. This gesture is repeated many times. The third bird occasionally gets in a bow from the sidelines. The lady bows low and lies flat on her belly, she tilts her tail straight upward, she crooks back her neck and tilts upward her bill, and she quivers rapidly her partly spread wings. The carrier solemnly looks on, but makes no active response to this wanton gesture. Now the lady stands up and lifts high her head, the carrier follows suit and the birds twist and twine and rub necks in a most affectionate manner. It is a real "necking party" and the bills touch bills and pinch bills and tease one another cheek to cheek. Occasionally the female reaches down and pokes about the seaweed as though she thought she should cease such frivolous behavior and attend to her housekeeping.

In the course of thirty minutes the carrier made three trips for material which he evidently pulled up from the sea bottom about 200 yards off-shore. At each visit to the nest site he went through the same ceremony. In spite of the love making at the nest site the birds made progress and the nest soon took shape.

On December 31 we again visited the cormorant colony. The nests that were started on December 21 were apparently complete. Settled in each nest was a bird closely attended by a mate who stood just outside of the nest rim; there was no third bird in evidence.

The birds in the upper nest were performing in a weird manner. They squatted low, facing one another; their tails were erected at right angles to their bodies, and their necks were crooked into the form of a letter S with heads held low. Gleaming blue throat pouches were puffed out in front. As the birds faced one another in this attitude the tips of their slightly spread wings vibrated rapidly. Occasionally they touched throat patches and then their bodies took on an added shiver. After several

minutes of this strange maneuver the birds lifted together until they stood tall and straight with their heads held high. Now starting at their heads a wave of vibrations shivered down their bodies and was flicked off from the ends of their tails. Both birds now assumed a natural pose as though all the ecstasy of love making had been shivered from their systems.

As the cormorants puffed out their gleaming throat pouches they seemed to show a relationship to the *Sceloporus* lizards, who have a similar habit of puffing out gleaming blue throat pouches.

The love making of the cormorants was all very public and it was of interest to note that near neighbors paid not the least attention to the antics of a lovelorn pair.

We were rather surprised to find both birds of the pair of Brandt Cormorants wearing the full nuptial plumage. Naturally we thought that those long feathery white filaments of the back and the flowing white side whiskers were adornments of the male alone.

Among the Farallon Cormorants who occupy the upper terraces of the area there was no evidence of sexual excitement. However, some of the Farallons were wearing the shaggy white "eyebrows" of the nuptial plumage.

On January 31, all of the completed nests that could be seen were occupied by sitting birds, and beside each nest a second bird stood guard. Four of the nests were so close together that the rims almost touched. There was nothing to indicate that young had come to any of the nests.

The completed nests were bulky, well built affairs, apparently made entirely of eel grass, well matted and firmly plastered to the rocky platforms on which they rested. All nests were inaccessibly situated on the face of the sheer cliff and so we could not examine them closely. But studying them through our field glasses from a distance of a hundred feet or so we judged the nest rim to be from four to eight inches in thickness. An outside measurement around the cup appeared from our observation to be somewhere close to three feet. An incubating bird could rest comfortably with bill on one side of the rim and tail on the other side.

On February 28, the behavior of one of the cormorants at the nest we saw started on December 21, led us to suspect that young had hatched; but it was not until the morning of March 6 that we actually saw young birds. On this date the young were quite active, poking their heads out from under the protecting wings of their parent, and occasionally a bird would squirm free from cover, stand up and stretch high its neck. During the hour we spent with the cormorants we saw no food passed to the young.

While we were watching the cormorants a man in a rowboat passed close below the cliff. All birds flew from the cliff and took to the sea, except the birds on nests. These nesting birds refused to budge and no doubt the ever watchful Western Gulls were disappointed.

On April 6, the young of the nest of December 21 were almost as large as their parents and they looked as though they might venture from the nest almost any day. There were still many occupied nests in all stages of development, from eggs to well grown young.

On April 12 the apparently full-grown young were still at the nest site and still being fed by their parents. Western Gulls were not nearly so numerous and now it looked as though most of the cormorants would successfully rear their broods. However, nests not protected from above by an overhang are in danger, for it is the sport of boys to throw branches and rubbish over the cliff in an effort to dislodge the birds.

On our last visit to the cormorant colony (April 12) some few birds were just laying the foundations of their nests. It would appear from this that the cormorants of this colony have a long nesting period.—CHAS. W. MICHAEL, *Yosemite, California, June 4, 1934.*

Altitudinal Migration in Southern Utah.—During September and October of 1934, I had opportunity to observe the downward progress of altitudinal migration from Cedar Breaks National Monument to lower Zion Canyon. Cedar Breaks, 10400 feet elevation, is the most southerly extension of a great Boreal plateau extending through central Utah from the Wasatch and Uinta ranges of the Rocky Mountain system. It is only 29 miles, air line, from Zion Canyon, 3700 to 4300 feet elevation, which is one of the most northerly extensions of the Lower Sonoran portion of the Colorado River drainage. This close proximity of two extensive winter and summer habitats results in an

intensified altitudinal migration, since transients from the north "pile up" at the Breaks as long as possible before flying on down to the more slowly cooling deserts below Zion Canyon. The autumn bird population at Cedar Breaks is further increased by post-nesting migrants from nearby Austral and Transition Zone areas.

Such a pronounced concentration of birds renders observation of departure dates relatively easy, especially when autumn is heralded by a rather sudden drop in temperature, as it was this year. A definite migration wave started from the Breaks between September 30 and October 8, reached the middle altitudes of 7000 to 8000 feet (upper portions of Zion National Park) between October 1 and 20, and arrived in Zion Canyon from October 2 to 30, beyond which the wave spread out and became relatively lost in the flocks of various species stopping along the way at their respective winter ranges. It was noted that practically all but the permanent residents left the Breaks within a week, but in traveling south 29 miles and down-hill 6300 feet the wave had spread over a time interval of a month or more.

An attempt to secure accurate data on any one species was not very successful, but the following observations on Townsend Solitaire (*Myadestes townsendi*) may have some value. This species was last noted at Cedar Breaks on October 7. At middle altitudes, where there is a fairly constant resident population, the last of the large and apparently migratory wave was noted on October 19, and at low elevations in Zion Canyon the first arrival was heard on October 28. The last date has little significance, since most of the solitaires terminate their migration in the juniper forests of the higher Upper Sonoran Zone, only a few coming down to the lower edge of the Upper Sonoran in Zion Canyon.—C. C. PRESNALL, *Zion National Park, Utah, November 6, 1934.*

An Influx of Dickcissels into Central Colorado.—Over a period of many years only an occasional Dickcissel (*Spiza americana*) has been seen in Boulder County, Colorado. The writer, in five years of observation, had not seen one here until this past summer. During the summer of 1934, however, the species became abundantly established about the fields east of Boulder, and within a mile of town. I first observed singing males on June 28 and 29, two different individuals being seen; but they had probably arrived much earlier.

On July 7, on a short automobile trip especially for a census of the Dickcissels, fifteen singing males were observed on the telephone wires and road-side fences along a route of approximately six miles. In other words, in one summer the species attained an abundance in a new region nearly as great as that in its expected haunts farther east; for, during the past three summers, it was not reported near Boulder at all.

I have been wondering if the long period of drought (or unusually dry weather during the spring migration last year) may not have forced the species west. The immediate environment of Boulder is now favorable to the species, because, being irrigated, it is less subject to drought conditions than the region to the east. A letter from Mr. J. Earle Wycoff, Shenandoah, Iowa, suggests a confirmation of this theory. He informs me that on a trip from Boulder, Colorado to Iowa last summer, through Nebraska, only a few Dickcissels were seen. This theory of a sudden westward movement is in line, too, with the recent suggestion of Dr. W. P. Taylor (Ecology, 15, 1934, pp. 374-379) that extreme conditions rather than average conditions are of major importance in animal (or plant) distribution. Information from others who have observed the occurrence of Dickcissels during 1934 would be appreciated.—GORDON ALEXANDER, *Department of Biology, University of Colorado, Boulder, Colorado, November 3, 1934.*

Records of Green-tailed Towhees in the San Francisco Bay Region.—Previous to the present writing there have been but two records of Green-tailed Towhee (*Oberholseria chlorura*) in the region of San Francisco Bay. These are to be found in Pacific Coast Avifauna No. 18, page 125: A single bird was observed by W. O. Emerson in Golden Gate Park, San Francisco, May 9, 1884; and one was secured in a river bottom near San Jose during the winter of 1889 or 1890 and recorded by John Van Denburgh.

Since these records there have been two more. Donald D. McLean obtained a Green-tailed Towhee on April 30, 1933, on Silver Creek grade, about four miles southeast of Evergreen, Santa Clara County, on the slope of Mount Hamilton. On September 25, 1934, the writer trapped one of these birds in the University of California Botanical Garden, Strawberry Canyon, near Berkeley. This towhee was kept for three

days in a cage in the Museum of Vertebrate Zoology, Berkeley, and was then banded (no. C175932); it was released on the morning of the 28th at the spot where trapped. It was trapped again the same afternoon, once more on the 29th, and twice on the 30th. Since then I have not seen it.

It will also be of interest to record that on September 15, 1931, I trapped and banded a Green-tailed Towhee in the garden of a private home at La Jolla, San Diego County, California, within 50 yards of the cliffs overlooking the ocean.—E. L. SUMNER, SR., *Berkeley, California, November 5, 1934.*

A Creeper Foraging Head Downward.—Insofar as I can learn, creepers almost invariably fly, rather than creep, when essaying a descent, no matter how short the distance. Hence I was hardly able to believe my eyes when, at Cedar Breaks, Utah, on October 16, 1934, I noted a Rocky Mountain Creeper (*Certhia familiaris montana*) that was acting very much like a chickadee. It was first sighted high among the small limbs of a tall Engelmann Spruce where it fluttered about and hung upside down so convincingly that I had passed it by for "just another chickadee" when a thin high note caused me to stop for closer study with the binoculars.

The antics of this creeper were amazing. It would crawl up the trunk and out on the underside of a drooping limb to the very tip, where the limb bent almost directly downward. There it would teeter a moment, fly either down or up to another limb tip, and creep up toward the trunk. Sometimes it would reach the trunk and start down the next limb, but more often it would flutter to another limb below or above, and creep a short distance with no apparent regard for the direction it took. Often it would creep down a limb, then turn around and creep up, but it never traveled far without fluttering to a new limb. The upside down creeping was always on the lower side of the limbs, and was always started from the trunk or from a short flight to a limb; it was never started by reversing directions when creeping upward.—C. C. PRESNALL, *Zion National Park, Utah, November 6, 1934.*

Three Subspecies of Birds Not Previously Reported from Kansas.—Recently, while studying the collection of the University of Kansas Museum of Birds and Mammals, and the Goss collection at Topeka, I discovered several specimens of birds which I believe to be worthy of note.

Tringa solitaria cinnamomea. Western Solitary Sandpiper. Four skins of this western subspecies were examined, three of which are in the collection of the Museum of Birds and Mammals, and one in the Goss collection, at Topeka. They were taken at Neosho Falls, August 15, 1879 (Goss coll.), Douglas County, May 6, 1909, and April 16, 1915, and in Hamilton County, July 15, 1921. The last three have been examined by H. C. Oberholser.

Molothrus ater artemisiae. Nevada Cowbird. A male in the Goss collection, taken at Neosho Falls, May 7, 1878, is considered to be intermediate between *Molothrus ater artemisiae* and *M. a. ater*, but nearer to the former. In the proportion of depth of bill to length of culmen, it is more like *ater*, but the culmen is depressed, rather than tumid. The wing measures 114.5 mm., which is too large for *ater*. It has been examined by Dr. J. Grinnell. Two specimens in the Museum of Birds and Mammals are referred to this subspecies. Both are males, taken in Barber County, May 17, 1911 (wing 111.5 mm.), and at Lawrence, April 13, 1915 (wing 113 mm.). The Nevada Cowbird is probably a fairly common migrant in the western part of the state, but not enough collecting has been done there, at the proper season, to determine this with any degree of certainty.

Passerculus sandwichensis nevadensis. Nevada Savannah Sparrow. A female (K. U. no. 13664) collected in Douglas County, April 23, 1924, by R. A. Stirton, proves to be of this race. The edges of the lateral rectrices are white, and the feathers of the back are edged with pale clay color instead of buffy or chestnut. Dr. Grinnell has examined this skin, and confirmed the identification. Many of the skins of the Western Savannah Sparrow in the museum collection are intermediate toward this subspecies, in having the edges of the lateral rectrices white, but this is the only specimen which seems to be typical of *nevadensis*.—W. S. LONG, *Museum of Birds and Mammals, Lawrence, Kansas, October 29, 1934.*

The Subspecific Status of the Hutton Vireo of Vancouver Island.—The latest critical comments upon the Hutton Vireos of the Northwest Coast portion of the general range of *Vireo huttoni* were published almost simultaneously twelve years ago by two authors: Oberholser (Auk, 39, 1922, pp. 77-78) and Grinnell (Condor, 24, 1922, pp. 32-33). These students, arriving at their conclusions independently, were in agreement that *Vireo h. obscurus* Anthony, based on a specimen from Beaverton, Oregon, must be synonymized under *V. h. huttoni* Cassin, originally named from Monterey, California. But not quite such accord was shown as to disposal of the name *V. h. insularis* Rhoads, named from Victoria, Vancouver Island, British Columbia.

In this last regard, Oberholser (*op. cit.*, p. 78) made the following statements: "Unfortunately for the status of *Vireo huttoni insularis*, none of the Vancouver Island or other Birtish Columbia specimens can be satisfactorily separated from California birds from the region about San Francisco Bay. The male type of *Vireo huttoni insularis*, from Victoria, British Columbia, and another specimen from the same locality, appear at first sight to be somewhat darker both above and below than California examples, but this apparent difference is readily traceable to some accidental soiling of the plumage. These facts, together with the lack of any differences shown by other specimens from Vancouver Island, take away all the present claim that *Vireo huttoni insularis* has for recognition as a subspecies." Grinnell (*loc. cit.*) stated: "Hutton Vireos from Vancouver Island are notably rare in collections. In the Museum of Vertebrate Zoology there are but two, both from Victoria. Both are dark as compared with Monterey *huttoni*; but both look to me to be smoked. I wouldn't care to rest the case for or against *insularis* on this scanty material. But before this name is given formal recognition by the A. O. U. Committee on Nomenclature, perfectly fresh, unfaded material should be available in fair quantity."

It happens that Major Allan Brooks has long been interested in this question—of the status of the Vancouver Island Hutton Vireos; and as a result, despite the apparent scarcity of the birds, he has now assembled a fair series. Out of this series he lately forwarded to me eight specimens, selected as not smoked or stained and hence of positive significance, with the suggestion that I look at them critically and report my findings. These specimens are before me at this writing, and I find them to show unquestionably darker, especially greener, tone of coloration dorsally and laterally, than specimens in corresponding condition of plumage from Oregon and California. However, I can detect no peculiarities in measurements or proportions.

In detail, the Brooks birds were collected in the months of December, January and March, at Comox, Nanaimo and Craig's, Vancouver Island. There can be no question that they are free from any adventitious discoloration and that they are unworn and unfaded. In a selected example, no. 3541, Brooks coll., from Comox, January 20, 1920, the back is nearest Dark Greenish Olive (of Ridgway, 1912, pl. XXX), as contrasted with near Deep Olive (the same, pl. XL) in no. 30488, Mus. Vert. Zool., from Seaside, Monterey County, California, of date January 12, 1919. While I am quite able to see a tendency toward the "sooty suffusion" remarked by Rhoads, my own eye receives the greatest impression of a more intensified *greenness* in all of the Vancouver Island birds. This is so well marked and so uniform a feature, in comparison with the southern populations, that I have no longer any hesitation in adjudging the Vancouver Island population of Hutton Vireos to represent a recognizable race, *Vireo huttoni insularis*.

Incidentally, one bird in the collection of the Museum of Vertebrate Zoology from the Puget Sound region of Washington (no. 37080, South Tacoma, taken by J. H. Bowles, December 7, 1906) is very near, if not identical with, some of the Vancouver Island birds, and points toward a range for *insularis* possibly inclusive of the Olympic Peninsula and some adjacent territory. But available and pertinent material is too meager for the settling of this point.

It turns out, then, that Rhoads' original comments (Auk, 10, 1893, pp. 238-241) upon the Vancouver Island race which he named were, both nomenclaturally and ecologically, peculiarly appropriate.—J. GRINNELL, *Museum of Vertebrate Zoology, Berkeley, California, June 15, 1934.*

Nesting of the Pacific Evening Grosbeak in the Vicinity of Echo Lake, Eldorado County, California.—Evening Grosbeaks (*Hesperiphona vespertina brooksi*) made their appearance in the Echo Lake region during the summer of 1934 on June 22. Arriv-

ing in considerable numbers for this rather rare species, many of them started nesting immediately. Wherever two birds selected a site they could be heard noisily engaged in collecting the rather delicate materials which go into the construction of their nest.

One pair selected a location some 35 feet up at the end of a large limb of a tamarack which stood on the edge of a path that was used constantly by a number of people. This location afforded the writer an unusual opportunity to observe the building process. The female did all of the work, although the male was in constant attendance. Three separate areas seemed to be used exclusively for the gathering of material. The female would fly to one of these spots, alight on the ground and after fussing around for a few moments would gather a carefully selected beakful of materials. During this process the male would invariably be within a few feet of her, chattering incessantly. As soon as a load of material was gathered she would take flight in a direct line for the nesting site, with the male right behind her. During this flight she emitted a monotonous, choked, call-note, while the male vigorously and noisily proclaimed his presence to the wide world.

Arrived at the nesting site the female busily engaged herself with the delicate task of arranging her load of materials while he again stood noisily by and seemingly urged her on. Right from the start the nest-building was performed from the inside out; that is she placed herself in the center of the nest structure and then placed the materials with her beak, weaving them into their permanent position by screwing her body around. Starting shortly after daylight each morning, the female averaged one trip every three minutes. Slightly over a minute was spent in arranging the material in the nest and the balance of the time in making the round trip to the material-gathering center. About nine o'clock in the morning time was taken out for about an hour for feeding and preening. Again, about one in the afternoon, a similar period was noted. Aside from these two periods the female worked constantly, from daylight until dark, with the male always in attendance but never deigning to do any of the actual labor. Many times he seemed to goad her on to greater effort, as some straw-boss might drive his crew!

It was my good fortune to observe this pair select the nesting site, after no end of fussing and inspecting on the part of the female. The placement of the first load of materials was also witnessed and I had visions of following the nesting routine through to its ultimate completion—the day when the young would be able to leave the nest. But I reckoned without mother nature, for after two full days of observation, during which time the nest had reached an estimated two-thirds completion, along came one of those typical freak snow storms which are not uncommon to the Sierra at that time of the year. It started snowing and blowing a gale about four in the afternoon and lasted most of the night. At first the Grosbeaks kept right on with their nest-building, but along about five o'clock I heard them no more. The next morning, with about four inches of snow on the ground, they were nowhere to be seen or heard. Constant observation for several days thereafter failed to disclose any sign of them, and so ended my opportunity to carry on a little study. Whether the birds were killed in the storm or were simply discouraged, it is impossible to say. A Cassin Purple Finch (*Carpodacus cassinii*), which was nesting in an adjoining tree, was found frozen to death on her nest and three eggs, and doubtless many other birds suffered a similar fate.

Not to be daunted I spent the next several mornings in a search for other nests of the Evening Grosbeak. By diligent and persistent work three were finally located, but they were at such a distance from camp as to make constant observation impossible. The location of each nesting site was the ultimate result of many laborious hours of trailing either the male or the female or both. The loud, raucous note of the male can be heard at quite a distance, especially early in the morning. At this time, generally around 4:30 or 5:00, the female leaves the nest and goes for a brief jaunt with her mate. In quest of food, and probably exercise too, after a long night on the nest, the pair keep up a constant Grosbeak conversation. It is this chatter which made it possible for me to trace them to their nests. As soon as the male seemed to think that his mate had been away from her nest long enough, he herded her back to it with perfectly visible proddings and scoldings. Once in the air they generally followed a direct line from the feeding location to the nest, chattering incessantly during this flight. Once the female was ensconced again on her nest, the male would generally fly back to the feeding area. And strangely enough, each pair seemed to have a definite area in which the birds did almost all of their feeding. Here the

male could generally be found, although he made frequent and regular trips back to the nest to see that everything was safe at home.

At no time was I able to find the male aiding with incubation or nest building. In the one nest that I was able to observe containing young, he did help with the feeding process.

The second nest was located about 45 feet up and three feet out from the trunk of a small tamarack. The tree stood not thirty feet from an occupied cabin near the lake shore. It contained four fresh eggs which the female had not yet started to incubate.

Nest number three was situated about thirty feet up at the end of a small branch of a tamarack. This tree too stood just a short distance from an occupied cabin on the lake shore and in almost every respect was identical with number two. It contained three well incubated eggs.

Nest number four was located well up on the steep mountainside overlooking the lake. Several days were required to locate it, primarily because of the distance which the birds flew from the feeding to the nesting location. The nest itself was placed just a short distance out from the trunk and on top of a fairly large limb of a red fir, some forty feet above the ground. The nest itself was similar in every respect to those above and contained three well-incubated eggs.

When flushed, the females invariably stayed within a few branches near their nests, chattering and complaining incessantly. In no case was a female flushed by throwing an object at the nest, although in one case the nest was actually hit with a small stick. Not until I was within a few feet of it would the female leave, and in each case as soon as I retreated she would go back on again. Her chattering generally brought the male, within a few minutes, which shows that the feeding area must be close enough to the nest that the parents are in constant communication. The nests of these birds are all practically the same, judging from those mentioned above. They were all quite visible from below, of almost identical size, and constructed from similar materials. Following are measurements (all figures are average), from nest number two: Depth outside, 4 inches, width 5½ inches, length 9¾ inches. Depth inside, 1⅞ inches, width 2 ¾ inches, length 3⅞ inches. Materials, framework entirely of small, dead spruce (?) twigs averaging from three to nine inches in length and evidently broken off from the tree. Inner part, or nest proper, constructed of fine rootlets (chiefly dark brown and I think from small tamarack shoots) and a few, fine, strawcolored grasses which are interwoven into the top or surface layer of the nest lining. This second or inner part of the nest varies from an average thickness of slightly less than an inch on the bottom to ⅝ of an inch at the top of the sides. This part, too, is much darker and browner than the outer structure of twigs, which are a typical evergreen gray.—DUDLEY S. DEGROOT, *State College, San Jose, California, August 28, 1934.*

The Lesser Yellow-legs near San Diego in Winter.—Mrs. Michael and I spent the day of January 10, 1934, at Mission Bay, San Diego County, California. Last November when we were there we had several visits with the Greater Yellow-legs (*Totanus melanoleucus*) and got to know this species fairly well. The Lesser Yellow-legs, (*Totanus flavipes*), however, remained a complete stranger. About all we knew about him was that he is a small facsimile of the Greater Yellow-legs and that he is not supposed to be in this section of the country at this time of year.

On the day in question soon after we arrived at the mud flats two birds took wing and instantly we realized that they were not among the shore birds that we were accustomed to seeing. We both guessed Yellow-legs. Their graceful flight carried them up an arm of the slough. We followed along the railroad track and where the arm of the slough meandered close to the track we found the birds feeding. One was feeding in the company of two Willets and two Godwits, the other was on the shore near a Willet and a Black-bellied Plover. Now we were intrigued; the birds were too small to be the Greater Yellow-legs. Feeding side by side with the Willet, the Yellow-legs appeared but half his bulk. Standing with his head held high, there was not such a great difference in the height of the birds although it was quite apparent that the Willet was the taller of the two. Now the Willet is a slender bird, but the Yellow-legs was noticeably of a more slender build. He was a rangy bird, of quick and jerky movements, and he moved over his feeding ground with long strides.

He appeared to step out with wider and more "get there" strides than other shore birds use. He did not forage systematically, but moved rapidly along, making flashing jabs in the mud on both sides and in front. Foraging in this manner he was constantly jerking his head from side to side. During occasional pauses he would up-bob his head in the manner of a Willet, only more so. Most of the time he was feeding in shallow water, but often he got in belly-deep.

The Willets and Godwits that were feeding with the Yellow-legs appeared to probe more intelligently; in other words, they probed only where a prospect was indicated. The Yellow-legs jabbed indiscriminately. His system, if any, was to work fast, jab everywhere miss or hit, and by covering more ground than the systematic probers he would fare as well in the end. And besides, all his actions seemed to indicate a nervous disposition that would not permit of the slow but sure methods.

Standing beside the Yellow-legs, the Black-bellied Plover looked plumper and more hunchy than ever; actually his body appeared to bulk larger and heavier than the body of the Yellow-legs.

For two hours we sat on the bank of the slough with one Lesser Yellow-legs on our right and one on our left, all of the time hoping that one or the other would move within photographic range, but no luck. During this time several other Willets arrived to feed on the same flat with the Yellow-legs. Much of the time the birds were a hundred yards from where we sat, but even at this distance it was no trick at all to separate Yellow-legs from his companions. As he moved about, his quick, jerky mannerisms, his ceaseless jabbings and his hurried stridings set him apart. And also at this distance his gleaming breast was a conspicuous mark compared with the dull breasts of the Willets.

Later in the day we saw other Lesser Yellow-legs and finally we got within "shooting" range. This was a matter of luck; we had the camera set up and were taking a picture of a Long-billed Curlew when our friend the Yellow-legs walked into the scene.

During the day we saw nine Lesser Yellow-legs; always they were feeding with other shore birds, but not once did we see two Yellow-legs feeding together.—CHAS. W. MICHAEL, *Yosemite, California, June 4, 1934.*

Water Ouzel Nests on Black River, Arizona.—Black River, in the White Mountains of Eastern Arizona, still an area remote from heavy traffic, is a naturalist's paradise. Here, on May 17, 1934, I located and photographed a Water Ouzel (*Cinclus mexicanus unicolor*) nest with two hungry young in it. I watched the parent birds tilting anxiously up and down on the wet, slippery stones in mid-river, while I stood, tip-toe, on a convenient rock to look into the nest for the young.

The nest, secure in the niche of a rock bluff overhanging the water, was a mossy, mound-like structure padded inside with straw. The entrance was from below at an angle of forty-five degrees.

I am indebted to Mr. Grover Pfluger, foreman of the Fish Stream Improvement in that region, for knowledge of these ouzels. He had previously seen two nests, one with two young in it, other than the one I found, in a section locally called "The Narrows," at an altitude of 9000 feet. Later, he and Mrs. Pfluger saw six nests on Black River, a thousand feet lower in altitude. One of these contained two eggs. May 19, I observed Water Ouzels in the "Box" of Black River at 7000 feet, but I did not locate a nest.

Both Mr. Pfluger and I noticed ouzels on Eagle Creek, Greenlee County, at 5200 feet. Since the stream offers favorable locations for Water Ouzel nests, it is possible that nesting may occur here,too.—CHARLES W. QUAINTANCE, *Rocky Mountain National Park, Estes Park, Colorado, August 12, 1934.*

An Anserine Fossil from the Pliocene of Western Nebraska.—In August, 1931, a field party from the University of Kansas Museum of Paleontology made a small collection of Middle Pliocene vertebrates from the type locality of Darton's Ogalalla formation in southwestern Nebraska. In this collection was a fragment of a bird sternum, which, through the kindness of Mr. C. J. Hesse, of the University of California, was turned over to me for examination. This specimen, Kansas University Museum of Paleontology, no. 3795, is from the Ogalalla Pliocene at its type locality (Feldt Ranch Beds), SE¼ of Sec. 33, T14N., R38W., Keith County, Nebraska, and was collected by C. W. Hibbard and W. C. McNown.

This sternum consists of all of the right and half of the left coracoidal arches and a small section of the sternal plate on the right side. The flatness of the sternal plate, the general contours of the lips of the coracoidal sulci, and the nature of the manubrial spines determine the specimen as anserine, more specifically as related to members of the sub-family Anserinae, the geese. The upper surface of the dorsal lip of the coracoidal sulcus is flat, relatively light in structure, and is as long as in a skeleton of a Canada Goose (*Branta c. canadensis*, Mus. Vert. Zool., no. 22457, ♂). The anterolateral surface of this lip is flattened vertically and does not protrude to the extent that it does in modern genera. The sterno-coracoidal process and part of the ventral labial prominence are broken from the specimen. The surface posterior to the coracoidal sulcus is flat and meets the sternal plate at a sharp obtuse angle. The sternal plate is thin and flat. A pneumatic foramen is present. The dorsal manubrial spine is a slight, V-shaped prominence. The ventral lip of the coracoidal sulcus is wide, extends farther forward than it does in Recent genera, and curves upward instead of downward at its anterior margin.

Although the specimen is only a small portion of the sternum, it is well preserved and represents, possibly, the most diagnostic region of that skeletal element. The sterna of North American geese of the genera *Anser*, *Branta*, *Chen* and *Philacte*, and the South American *Chloephaga*, do not exhibit many characters sufficiently reliable to separate them one from another. However, the shape and proportions of the coracoidal lips are somewhat characteristic, and in this regard the fossil specimen resembles *Anser* and *Chen* more than the others. In present-day geese the dorsal manubrial spine exhibits wide variation in height and width, but I found none so poorly developed as in this fossil. The surface for articulation with the coracoid indicates that the sternal facet of this latter bone was considerably wider dorsoventrally than it is in *B. c. canadensis*.

Considering that the sternum is not an element that lends itself readily to specific identification, and that the specimen under consideration is fragmentary, no attempt is made here to assign it other than to the subfamily Anserinae. It is probable that it is a member of an unknown genus and is a new species. The record is of interest since it demonstrates the existence in the Pliocene of an anserine unlike any heretofore known from that epoch.

I am indebted to Dr. Alexander Wetmore for valuable suggestions relative to the treatment of this fossil.—LAWRENCE V. COMPTON, *Museum of Paleontology, University of California, Berkeley, August 15, 1934.*

Winter Wren and Pileated Woodpecker on the Greenhorn Mountains, California.—The Greenhorn Mountains constitute a southern section or extension of the Great Western Divide, a north-south subdivision of the southern Sierra Nevada of California lying directly west of the main Kern River. They are crossed by a through road from Glennville to Kernville, in Kern County. At the "Summit" on this road, a branch road now "under improvement" extends north some miles along the ridge and, as the latter increases in altitude, gives access to Canadian-zone conditions of flora and fauna at their southernmost extensions along the Greenhorn Mountains.

On October 13 and 14, 1934, I was privileged, all too briefly, to visit this locality, until now not referred to, to my knowledge, in vertebrate faunal records. My companion, Dr. J. Eric Hill, and I camped over night where the ridge road referred to, reaches an altitude (by my aneroid) of 7000 feet, and right where a road-sign indicates that it crosses the east-west Kern-Tulare county line. This is about six miles north of the "Summit" above mentioned. The drainage is to the east steeply down Cow Creek, a tributary of Bull Run Creek, which leads into the canyon of the Kern River. A heavy forest chiefly of red fir covers the gentler slopes and benches at this level. Indications are that there is normally a deep snowfall, and potentially much moisture-loving vegetation; but heavy grazing in an extra dry season had produced conditions by autumn of this year, distressingly barren on and about the little "meadows."

Of the birds we noted, two are worthy of remark. In the late afternoon of October 13 we saw, and watched till its disappearance in the tangle, a Western Winter Wren (*Nannus hiemalis pacificus*). It was bobbing about among the debris of a long-fallen red fir at the upper margin of the meadow, making its presence clearly apparent to us by voice and movements. Of course this bird might have been an autumn vagrant

or migrant, like the individuals of this species that reach southern California in certain years. On the other hand, it might mark a southern breeding station of the species which, however, at best is of sparse occurrence in the Sierra Nevada. The southernmost previous record, and one definitely of breeding, is at 5000 feet altitude near Doyle, toward the head of the Tule River, east-northeast of Porterville, in Tulare County (Rowley, Condor, 30, 1928, p. 160). The bird seen by Hill and me in the Greenhorns was also in Tulare County, but only a few rods up a "draw" from the Kern County line.

The other bird of special note was the Western Pileated Woodpecker (*Ceophloeus pileatus picinus*). In the afternoon of October 13 I kept hearing at intervals the characteristic flight-utterances of this species off through the woods. And toward evening, at 5:30, when the eastern slopes had been overtaken by deep shadow, as Hill and I were making camp, here came an individual winging its way up through the firs in plain sight of both of us—from Kern County into Tulare County. By following its flight course, I soon found a big dead fir, top gone, in the bole of which some 60 feet above the ground was the entrance to what I judged to be a one-time nesting cavity of this woodpecker. The thought that the bird seen might be using this cavity for night roosting was not corroborated by any result of our visit to the place very early the next morning.

Here, then, is a station for the Pileated Woodpecker, considerably the southernmost to date known in California. The previous southernmost record station is for Weishar Mill, East Fork of Kaweah River, Tulare County (Van Denburgh, Proc. Acad. Nat. Sci. Phila., 1898, p. 210). This species in the Sierra Nevada seems peculiarly characteristic of that type of forest in which either the red fir or the white fir predominates.—J. GRINNELL, *Museum of Vertebrate Zoology, Berkeley, California, November 11, 1934.*

NOTES AND NEWS

A Naturalist is a man who accepts the universe as a reality—everything in it, and he accepts it gladly. He trusts in equal measure his powers of observation and his powers of thinking. The proper point of view of a true naturalist leads him not to take nature or any of its parts as an enemy to be fought, but to try to understand it and to accommodate himself to it, and it to him, as his best understanding and his best long-time interests indicate. —WILLIAM E. RITTER.

The Tenth Annual Meeting of the Cooper Ornithological Club will be held in the San Francisco Bay region in the early part of May, 1935. The sessions for the presentation of papers will be held under the immediate auspices of the Museum of Vertebrate Zoology, in the Life Sciences Building, University of California, Berkeley. President Loye Miller, of the Board of Governors of the Club, has appointed the following local committee to arrange for the meeting: General Chairman, Alden H. Miller; Hospitality, Amelia S. Allen; Affiliations, H. S. Swarth; Meeting Places, William B. Davis; Finance, J. Grinnell. Details of arrangements will be announced in the March issue of the *Condor*. The Fourteenth Annual Meeting of the Board of Governors will be held in connection with the Annual Meeting of the Club. It is expected that this meeting will be the first under the new articles of incorporation; these should go into effect early this year.—A. H. M.

PUBLICATIONS REVIEWED

LIFE HISTORY OF THE GAMBEL QUAIL IN ARIZONA, by DAVID M. GORSUCH (University of Arizona Bull., vol. V, no. 4, Biological Science Bull., no. 2, May 15, 1934, pp. 1-89, illustrations).

In 1896 the writer of this review traveled behind a team of horses from Los Angeles across the Colorado Desert and across southern Arizona. His memory of the Arizona portion of the trip is that quail were rarely, if ever, out of sight or hearing. All day long and day after day they scurried across the road; the birds were there in such countless numbers and humanity was so nearly absent that any suggestion of a future scarcity of quail could hardly have been entertained. In 1930, on a trip by auto that covered practically the same route, perhaps twenty quail were seen! Making all allowances for different modes of transportation, the two sets of observations show plainly enough how rapidly the Gambel Quail is following the path taken by so many other American game birds.

Without a determined effort toward conservation it can hardly fail to dwindle in numbers, not to extinction necessarily, but to a point where it can no longer serve as an object of sport.

Realization of this fact brought about the "Gambel Quail Investigation", initiated July 1, 1930, under the joint auspices of the University of Arizona and the Sporting Arms and Ammunition Manufacturers' Institute through Mr. Aldo Leopold. For three years Mr. Gorsuch has been pursuing this investigation, the outstanding results of which are now placed before us. The reviewer, familiar with the exact place where these studies were pursued, has nothing but admiration for the methods of observation that were developed, and is content to accept outright the conclusions at which Mr. Gorsuch arrived. With these quail as with other animals, the circumstances that control their numbers after the disturbing introduction of a large human population are not easy to understand or to govern, and they are rarely the factors on which the sportsman is likely to place emphasis. It is encouraging in this connection to read Mr. Gorsuch's plea for the conspicuous and generally harmless large hawks of the region. With the facts here demonstrated and with the further studies that the author suggests, there is no doubt that a technique could be developed whereby a practically unlimited number of quail could be provided for sport—if the sportsman, too, could be placed under control. The results of the highly specialized handling of native English game birds show what can be done under private ownership of land and game, but nowhere yet has anything approaching such results been attained where a large human population has free access over any hunting ground. However this may be, Mr. Gorsuch's account of the Gambel Quail may be accepted as an accurate depiction of facts and conditions, and his recommendations should be permitted to carry influence with officials in authority.

As to the form in which the report is couched, one can only admire the clear, concise style, and the total absence of "padding"; there is a wealth of information logically presented in a minimum of printed pages. Mr. Gorsuch has done excellent work in gathering facts, and in evaluating and presenting them. We are grateful to the University of Arizona for its important share in the undertaking—the publication of the report.—H. S. SWARTH.

MINUTES OF COOPER CLUB MEETINGS

SOUTHERN DIVISION

SEPTEMBER.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at 8 p. m., Tuesday, September 25, 1934, at the Los Angeles Museum, Exposition Park, Los Angeles, with President Abbott in the Chair and twenty-nine members and guests present. Minutes of the Southern Division for August were read and approved. Minutes of the Northern Division for August were read.

The following applications for membership were presented: Mr. Wendell Taber, 6 Rollins Place, Beacon Hill, Boston, Massachusetts, by A. J. van Rossem. Mr. Samuel C. Harriot, 200 West 58th Street, New York, N. Y., by W. Lee Chambers; Mr. Philip C. Dutton, 65 High Street, Stone Staffs, England, and Emerson Ware Stanley, P. O. Box 131, Garden Grove, California, by John McB. Robertson.

President Abbott read a communication with reference to the recreational use of land in the United States sent to him by the National Resources Board, Washington, D. C., and signed by George M. Wright, as Director of the Recreation Division. Enclosed with the letter was a questionnaire covering many phases, including populations and their recreational requirements; economic aspects of recreation; the theory of division of responsibility between federal, state, and local governments and private recreation agencies; relations of other forms of land-use and abuse to recreation; problems in recreational use of land set aside primarily for preservation; the ideal recreation land-use structure; and the ways and means of providing a program for its approximate realization. A committee, consisting of Dr. Loye Miller and Mr. George Willett, was duly appointed to study the questionnaire for the Southern Division and to report with regard to the same.

What might be behind the withdrawal of scientific collecting permits, following letters sent by the Secretary of Agriculture and by the Chief of the Biological Survey to various collectors in southern California, was discussed at length, and the question was raised as to what action, if any, the Cooper Club might wisely take. On suggestion made by Mr. Willett, it was decided to withhold any action until after the meeting of the American Ornithologists' Union at Chicago, in October, and

to be guided, possibly, by the action of that organization as to the best method of procedure.

Some interesting field observations reported were, that the Yellow-billed Magpie with all of its persecution does not seem to be greatly diminished in numbers; that Wood Ibis were again on their annual invasion of this section of California. Mr. Abbott mentioned 77 of the latter bird seen on one pond in San Diego County; and 30 were recently seen at Newport Beach by Dr. Miller. The species was also reported in Imperial Valley, and at Point Mugu. These Wood Ibises are presumably first and second year birds, non-breeders, and their invasion apparently occurs at the season when the adults are nesting in southern waters. In June, on Walker River at foot of Sonora Pass, Mr. Reis watched Calliope Hummingbirds take the sap of willow trees from holes made by sapsuckers. Dr. Miller said he had noticed Anna Hummingbirds and Audubon Warblers do the same thing. Twenty Black Brant were seen at Point Mugu on September 4, by Dr. Miller. He also reported having seen more Black Brant on the lagoon last year than ever before. Two sets of 5 eggs of the Western Evening Grosbeak at Mammoth Lake, and one set of 4 eggs at Twin Lakes, were found in mid-June by Mr. Harrison.

Mr. Meadows stated it was his belief that the appearance last April of the first Turkey Vulture reported from Catalina Island was not due to stormy weather. The bird was seen on a calm day and the weather had been calm for several days previous. It did not appear to be fatigued, and flew toward the interior of the island. In reply to Mr. Chambers' remark that a shooting season for quail was to be opened on Catalina Island, Mr. Meadows said to hunt quail on the island was not his idea of sport, as the birds were extremely abundant and very tame. His first pair of wild swan, assumed to be the Trumpeter, was noted by Mr. Howard Robertson while on a trip to Yellowstone National Park this summer. Mr. Reis told of a flock of 35 Sage Hens having been killed by scattered poison, and this brought about a discussion of the continued use of thallium and strychnine for poisoning. The Chair suggested a protest should be sent to the proper authorities against allowing unskilled persons to use poison in areas where Sage Hens were known to be, but no action was taken.

Meeting adjourned.—LAURA B. LAW, *Secretary.*

NORTHERN DIVISION

SEPTEMBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held at 8:00 p. m., Thursday, September 27, 1934, in the Life Sciences Building, Berkeley, with sixty-four members and guests present and Vice-president Miller in the Chair. Minutes of the Northern Division for August were read and approved. Minutes of the Southern Division for August were read. Proposals for membership were: Miss Ena Hoag, P. O. Box 407, Pacific Grove, Calif., by Laidlaw Williams; Mr. Elbert L. Little, Jr., Jornada Experimental Range, Las Cruces, New Mexico, by Walter P. Taylor. Miss Ivander MacIver, 2414 Telegraph Ave., Berkeley, Calif., by Margaret W. Wythe.

The first item on the program was the award of prizes to the winners of the Program Contest held by the Northern Division during the spring months. The junior winner, Mr. Cranson Hopkins, was presented by the Chairman with a set of Dawson's "Birds of California", a copy of A. A. Allen's "Bird Life", a leather-bound notebook, and a paid-up membership in the Cooper Club for two years. Mrs. Junea Kelly, winner of the senior award, was presented with copies of the following bird books: Howell's "Florida Bird Life", Mrs. Bailey's "Birds of New Mexico", Peterson's "Field Guide to Birds", Nicholson's "How Birds Live", and A. A. Allen's "Bird Life".

The most interesting field note was presented by Mr. E. L. Sumner, Senior, who reported the taking of a Green-tailed Towhee in a banding trap in Strawberry Canyon on September 25. Mr. W. B. Davis told of birds observed during a spring sojourn in southwestern Idaho. Sage-covered desert, basaltic cliffs, grassy meadow and a marshy lake provided four sorts of habitats, so differing that 46 species of birds were listed within the area accessible from Mr. Davis' camp.

Those members of the Northern Division who have had the pleasure of visiting the aviaries of Mr. and Mrs. Eric C. Kinsey at Manor, Marin County, have been so interested in the 60 species of native birds to be seen therein that Mr. Kinsey consented to talk to the group upon his hobby, "Ornithological Research through Aviculture."

Mr. Kinsey's spirited account of the difficulties overcome in the rearing of wholly insectivorous species included a description of Mrs. Kinsey and himself commuting to their daily work in San Francisco

accompanied by chorusing young Black Phoebes. Among problems not yet solved is the one of so feeding caged birds as to prevent color fading.

Adjourned.—HILDA W. GRINNELL, *Secretary.*

OCTOBER.—The October meeting of the Northern Division of the Cooper Ornithological Club was held on October 25, 1934, at 8:00 p. m. in Room 2003 Life Sciences Building, Berkeley, with Vice-president Miller presiding at the invitation of President Pickwell. Minutes of the Northern Division for September were read, corrected and approved. Minutes of the Southern Division for September were read. The Chairman announced that if no objections were heard the November and December meetings of the Northern Division would be held on the third instead of the fourth Thursdays.

Field notes reported were as follows: A Ferruginous Rough-legged Hawk was seen at Point Reyes on October 6 by John E. Cushing, and the noting of an adult and an immature of the same species on the same day at Bodega by Commander Parmenter was reported by Miss Pringle; on September 28, Mr. Dyer observed eight Lewis Woodpeckers at his home in Piedmont; on the night of September 24, Mrs. Allen heard a Poor-will calling in Strawberry Canyon, and becoming interested in the repeated calls, she began counting. One hundred and fifty were recorded before the bird became silent; Mr. Alden Miller reported the taking of a Sierra Creeper on October 21 in the blue-oak belt on Mount Diablo. Dr. and Mrs. Lynds Jones of Oberlin, Ohio, were guests at the meeting. Dr. Jones told of birds noted on their drive westward and said that only 30 dead birds were seen on the highway in a distance of 3000 miles. A Crow which was "paced" was found to be flying at the rate of 35 miles per hour.

President Pickwell was the evening's speaker and his illustrated talk, "Desert Studies", brought the desert and its fauna very clearly before us, especially "those most obvious and ever-present desert birds, the Verdin, the Cactus Wren, and the Plumbeous Gnatcatcher."

Adjourned.—HILDA W. GRINNELL, *Secretary.*

NOVEMBER.—The November meeting of the Northern Division of the Cooper Ornithological Club was held on November 15, 1934, at 8:00 p. m. in Room 2003, Life Sciences Building, Berkeley, with President Pickwell in the Chair and 130 members and guests present. Minutes of the Northern Division for October were read and approved. Names proposed for membership were: Adolph Murie, 328 Hilgard Hall, Berkeley, Calif., and Walter N. Powell, Sequoia National Park, Calif., both by Jean M. Linsdale.

Mr. Alden Miller reported having seen a Red-breasted Nuthatch recently on the Campus; Mrs. Mead, the presence of a Western Mockingbird at Piedmont and Parker streets, where it learned to mock the song of a household canary; Howard Twining, the sight of a Crow in the grounds of the State School for the Blind and Deaf. The last-named speaker added that, a few days before his record, Robert Failing had seen a Crow at the same place. Mr. Clark P. Streator told of the increasing colony of Mockingbirds at Santa Cruz and of the presence of two White Herons at the mouth of the San Lorenzo River in October, where to his knowledge they had not been seen since the 70's.

The evening's program was presented by Mr. Ernest I. Dyer: Thrashers and Road-runners at my Home, and a Glimpse of Condors—a Motion Picture Record. Mr. Dyer's studies of the Thrashers began in the summer of 1932 when he endeavored to divert the birds from digging up a newly planted lawn in their search for food. From that time on, the birds have been his daily and almost hourly companions. He has learned the extraordinary variety of their songs, from the "slumber song," audible for a distance of six feet, to the full song which carries at least three hundred yards. The birds' food and foraging habits, nest building, rearing of the young and hostility toward snakes were described, and a fine series of motion pictures was shown, with running comment.

The lone Road-runner first came into the picture last April, when he appeared in the neighborhood and made himself conspicuous by "calling down chimneys" forty feet above the ground. Most of his days are spent at 40 Selborne Drive and his nights in a nearby oak. Mr. Dyer's camera caught him as skillfully as it did the Thrashers, and a fine portrayal was the result. Typical Condor country in the southern part of California was then shown, and then Condors in flight. The last reel showed some superb close-ups of a Condor perched on a stub.

Adjourned.—HILDA W. GRINNELL, *Secretary.*